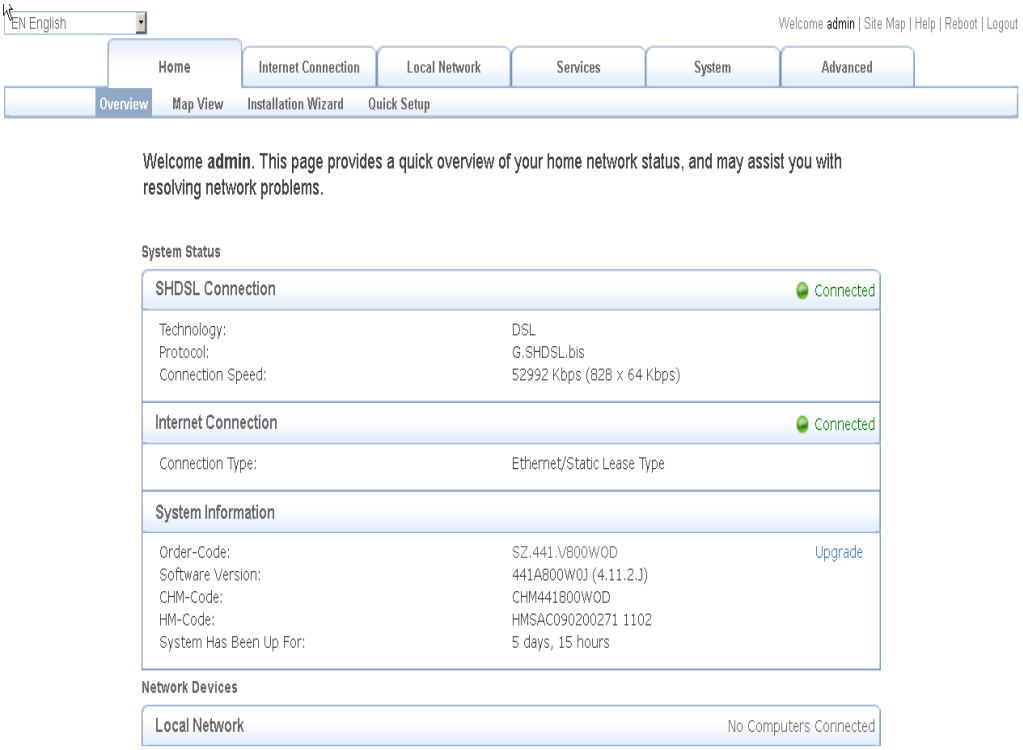
Watson SHDSL Router
Web-based Management Manual



Document Identification	Watson-SHDSL-Router-GUI-Manual.doc
Document Version	2.3-03
Document Revision	2012-02-29
Distribution	Customer

Revision History

Revision	Date	Author	Remarks
2.3.03	120229	MHb	Minor Update for TC-PAM 64/128
2.3-02	100819	MLr	Updated software license notice
2.3-01	100111	MLr	Added port-based VLAN stacking
2.2-03	091110	MLr	Minor Updates
2.2-02	091109	MLr	Added ALG Rules configuration
2.2-01	090907	MLr	Added Stacked VLAN configuration Added hierarchical QoS configuration
2.1-01	090406	MLr	Updated Manual for SW Release 4.11.2
2.0-01	080616	MLr	Updated Manual for SW Release 4.9.2
1.0-01	070615	MLr	First version

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1 Related Documents

[1] Schmid Telecom, Watson SHDSL Router Manual

[2] Schmid Telecom, Watson Ethernet Manual

2 Overview

2.1 Introduction

Watson SHDSL router is an innovative Next-Generation DSL solution designed for enabling high-speed Internet or point-to-point connectivity to business customers.

Watson SHDSL router uses Ethernet in the First Mile (EFM) technology, which is a transparent extension of Ethernet-base LANs into wide area networks. No conversion of packet formats is required when transiting between LAN and WAN. This transparency greatly simplifies network operations, reduces deployment costs, and increase service levels. EFM includes maintenance function that make the operation of large wide-area Ethernets feasible.

Watson SHDSL router features either two or four SHDSL ports. Symmetrical data rates up to 5.7 Mbit/s are available on each copper pair. Using EFM pair bonding, data rates of 22.8 Mbit/s over 4 copper pairs can be achieved.

Watson SHDSL router integrates an eight port Ethernet switch, an SPI Firewall and a VPN gateway, which protects networks by providing robust security features and standard IPSec Virtual Private Network tunneling.

Watson SHDSL router features a user-friendly graphical Web-based management interface. This highly intuitive GUI is easily mastered by the novice user, but is also highly flexible and offers sophisticated users and system administrators full control of the system.

This document describes the Watson SHDSL Router Web-based management with SW version 4.11.2.

3 Getting Started

Connecting your computer or home network to the Watson SHDSL router is a simple procedure, varying slightly depending on your operating system.

The setup is designed to seamlessly integrate Watson with your computer or home network. Moreover, zero-configuration is attained when taking advantage of Universal Plug-and-Play support in Windows XP.

The Windows default network settings dictate that in most cases the setup procedure described below will be unnecessary. For example, the default DHCP setting in Windows XP is 'client', requiring no further modification.

However, it is advised to follow the setup procedure described below to verify that all communication parameters are valid and that the physical cable connections are correct.

3.1 Introduction

The basic setup procedure consists of the following stages:

1. LAN and DSL connections [3.2]

2. PC network configuration [3.3]

3. Waston SHDSL router configuration [3.4]

3.2 LAN and DSL Connections

Your computer can connect to the gateway using one of the Ethernet interfaces that are available at the back of the Watson SHDSL router.

Consult Schmid Telecom, Watson SHDSL Router Manual [1] regarding the installation of your DSL connection.

3.3 PC Network Configuration

Each network interface on the PC should either be configured with a statically defined IP address and DNS address, or should be instructed to automatically obtain an IP address using the Network DHCP server. Watson provides a DHCP server on its LAN and it is recommended to configure your LAN to obtain its IP and DNS server IPs automatically.

This configuration principle is identical but performed differently on each operating system. Figure 3-1 displays the 'TCP/IP Properties' dialog box as it appears in

Windows XP. Following are TCP/IP configuration instructions for all supported operating systems.

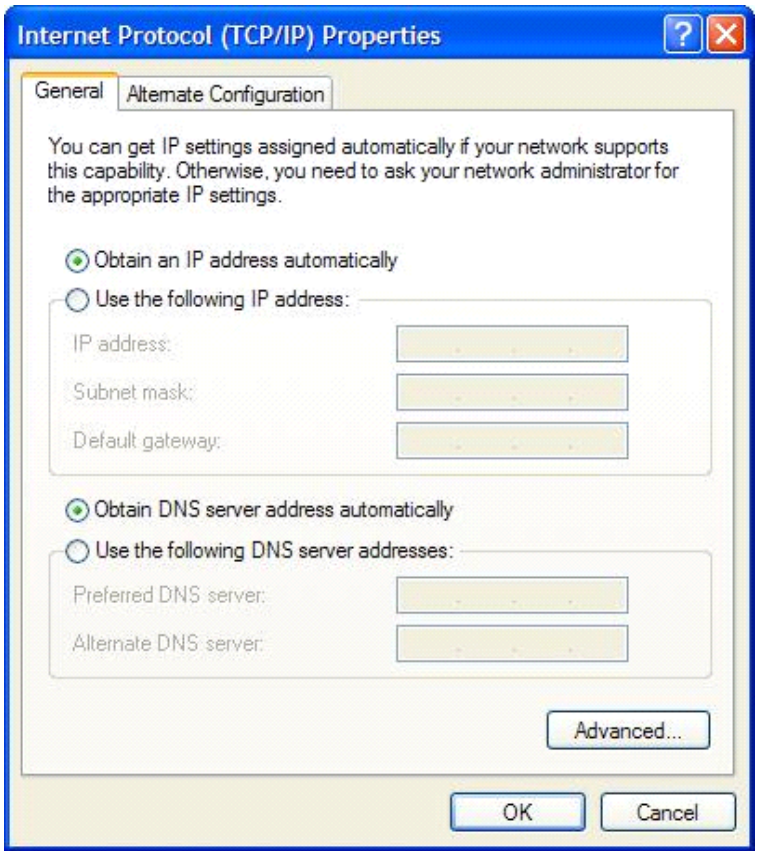

Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 3-1: IP and DNS Configuration

3.3.1 Windows XP

1. Access 'Network Connections' from the Control Panel.
2. Right-click the Ethernet connection icon, and select 'Properties'.
3. Under the 'General' tab, select the 'Internet Protocol (TCP/IP)' component, and press the 'Properties' button.
4. The 'Internet Protocol (TCP/IP)' properties window will be displayed (Figure 3-1).
    a. Select the 'Obtain an IP address automatically' radio button.
    b. Select the 'Obtain DNS server address automatically' radio button.
    c. Click 'OK' to save the settings.

3.3.2 Windows 2000/98/Me

1. Access 'Network and Dialing Connections' from the Control Panel.
2. Right-click the Ethernet connection's icon, and select 'Properties' to display the connection's properties.

3. Select the ’Internet Protocol (TCP/IP)’ component, and press the ’Properties’ button.
4. The ’Internet Protocol (TCP/IP)’ properties will be displayed.
    a. Select the ’Obtain an IP address automatically’ radio button.
    b. Select the ’Obtain DNS server address automatically’ radio button.
    c. Click 'OK' to save the settings.

3.3.3 Linux

1. Login into the system as a super-user, by entering ‘su’ at the prompt.
2. Type ’ifconfig’ to display the network devices and allocated IP’s.
3. Type ’pump -i <dev>’, where <dev> is the network device name.
4. Type ’ifconfig’ again to view the new allocated IP address.
5. Make sure no firewall is active on device <dev>.

3.4 Watson Configuration

In order to configure your Watson SHDSL router you need to access Watson’s Web-based management.

To access the Web-based management:

1. Launch a Web-browser on a computer in the LAN.
2. Type the gateway’s IP address. The default IP address is 192.168.1.1 .
3. Enter your username and password to log on to the WBM. The default user name is ’admin’, and the default password is ’admin’.

Refer to Section 4 if you need more informations on how to use the web-based management.

3.4.1 Configuring your DSL connection

Select 'Internet Connection' and then 'Settings'. The Internet Connection Settings screen appears.

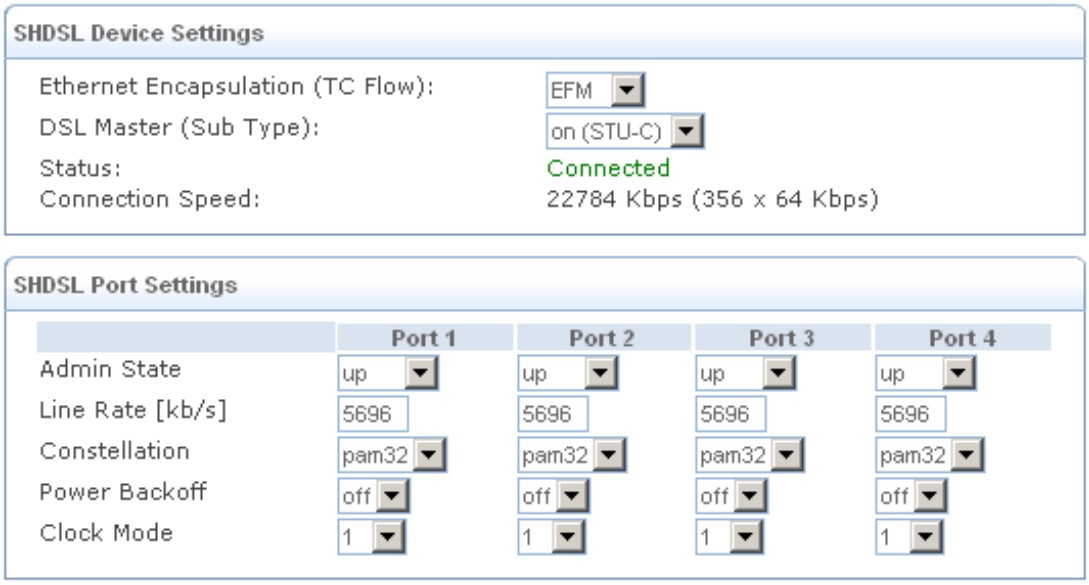


Figure 3-2: Internet Connection – DSL Settings

Refer to section 6.2 for a detailed description of the DSL Settings.

3.4.2 Configuring Your Internet Connection

When subscribing to a broadband service, you should be aware of the method by which you are connected to the Internet. Technical information regarding the properties of your Internet connection should be provided by your Internet Service Provider (ISP). For example, your ISP should inform you whether you are connected to the Internet using a static or dynamic IP address, or what protocols, such as PPTP or PPPoE, you will be using to communicate over the Internet.

Refer to Section 5.3 if you want to use the wizard that automatically diagnoses your network environment and configures Watson's internet connection.

Refer to 5.4 to learn how to manualy configure your internet connection using the quick setup.

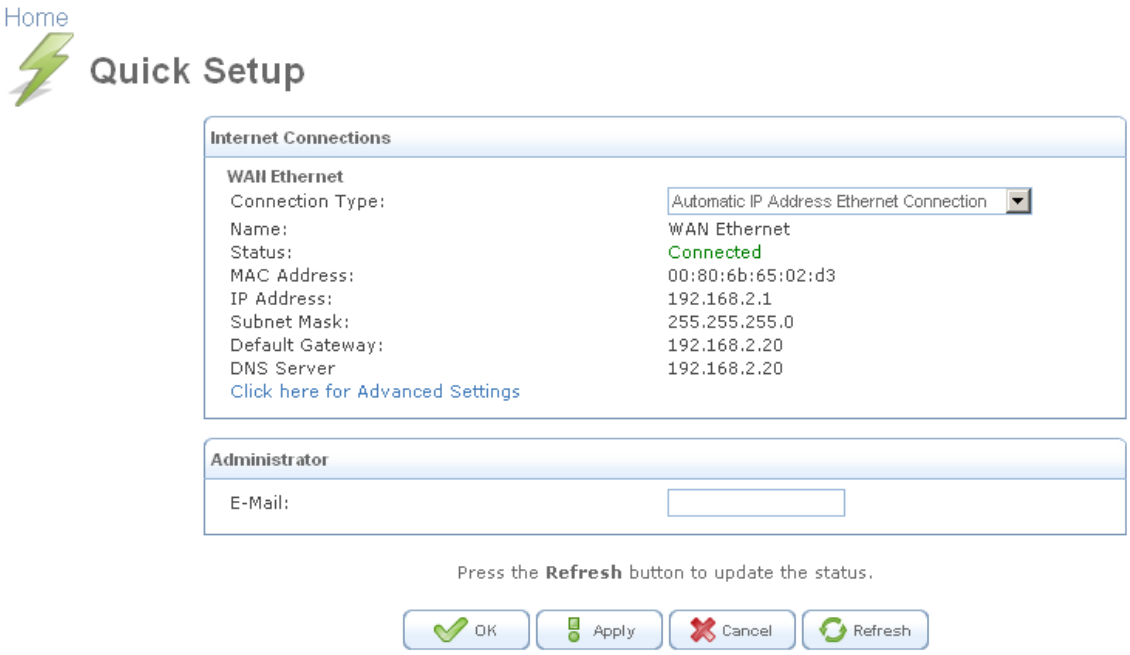


Figure 3-3: Quick Setup

4 Using the Web-based Management

This chapter describes how to use Watson Web-based management, which allows you to control all Watson's features and system parameters, using a user-friendly graphical interface.

4.1 Accessing the Web-based Management

To access the Web-based management:

4. Launch a Web-browser on a computer in the LAN.

5. Type the gateway's IP address. The default IP address is 192.168.1.1 .

6. Enter your username and password to log on to the WBM. For security reasons, you should change these settings after the initial login. The default user name is **'admin'**, and the default password is **'admin'**.

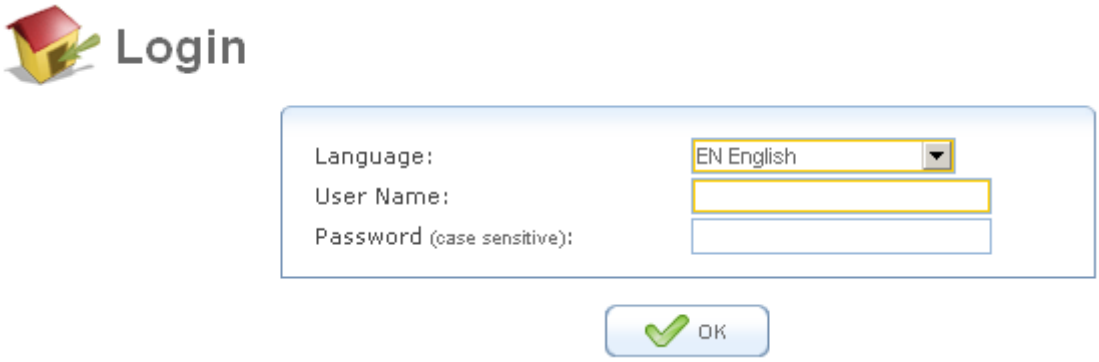


Figure 4-1: Web-based Management Login

Your session will automatically time-out after a few minutes of inactivity. If you try to operate the Web-based management after the session has expired the 'Login screen will appear and you will have to re-enter your user name and password before proceeding. This feature helps to prevent unauthorized users from accessing the web-based management and changing the gateway's settings

Note: If your computer is running an operating system that supports UPnP, such Windows XP, you can easily add the computer to your home network and access the Web-based management directly from within Windows.

4.2 Navigational Aids

The Web-based management is a user-friendly interface, designed as a Web site that can be explored with any Web browser. This section illustrates the WBM's page structure and describes its navigational components and their hierarchial manner.

Figure 4-2: Navigation Components

1. The top level navigational aids are the Tabs, grouping the WBM screens into several main subject areas.
2. Each tab has an Items Menu, listing the different menu items relevant for the subject.
3. A menu item may have a Links Bar, located at the top-right of the screen. These links further divide the menu item into different subjects.

For convenience purposes, the entire WBM part of this User Manual has been constructed in accordance with the structure of the WBM—the chapter structure is identical to the tab structure, sections are written after item menus, etc.

In addition, a constant link bar appears at the top of every WBM page, providing shortcuts to information and control actions. These links include the site map, help, reboot and logout.

Figure 4-3: Constant Link Bar

4.3 Managing Tables

Tables are structures used throughout the Web-based management. They handle user-defined entries relating to elements such as network connections, restrictions and configurable parameters. The principles outlined in this section apply to all tables in the WBM.

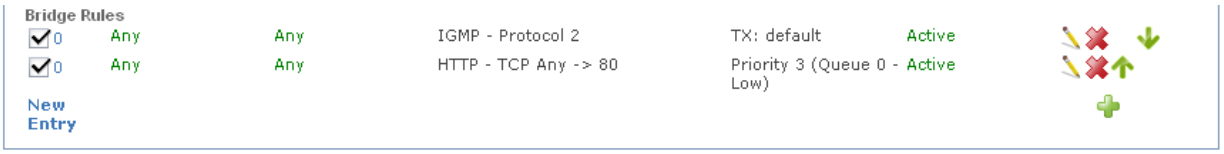


Figure 4-4: Typical Table Structure

Figure 4-4 illustrates a typical table. Each row defines an entry in the table. The following buttons, located in the 'Action' column, enable performing various actions on the table entries.

Use the Add action icon to add a row to the table.

Use the Edit action icon to edit a row in the table.

Use the Remove action icon to remove a row from the table.

Use the Download action icon to download a file from the table.

Use the Copy action icon to copy an item to the clipboard.

Use the Move Up action icon to move a row one step up in the table.

Use the Move Down action icon to move a row one step down in the table.

5 Home

5.1 Overview

The 'Overview' screen presents Watson's status summary in one convenient location. You can quickly and efficiently view important details of your connection status and hardware peripherals, as well as the statuses of Watson's different services. The following is the default 'Overview' screen.

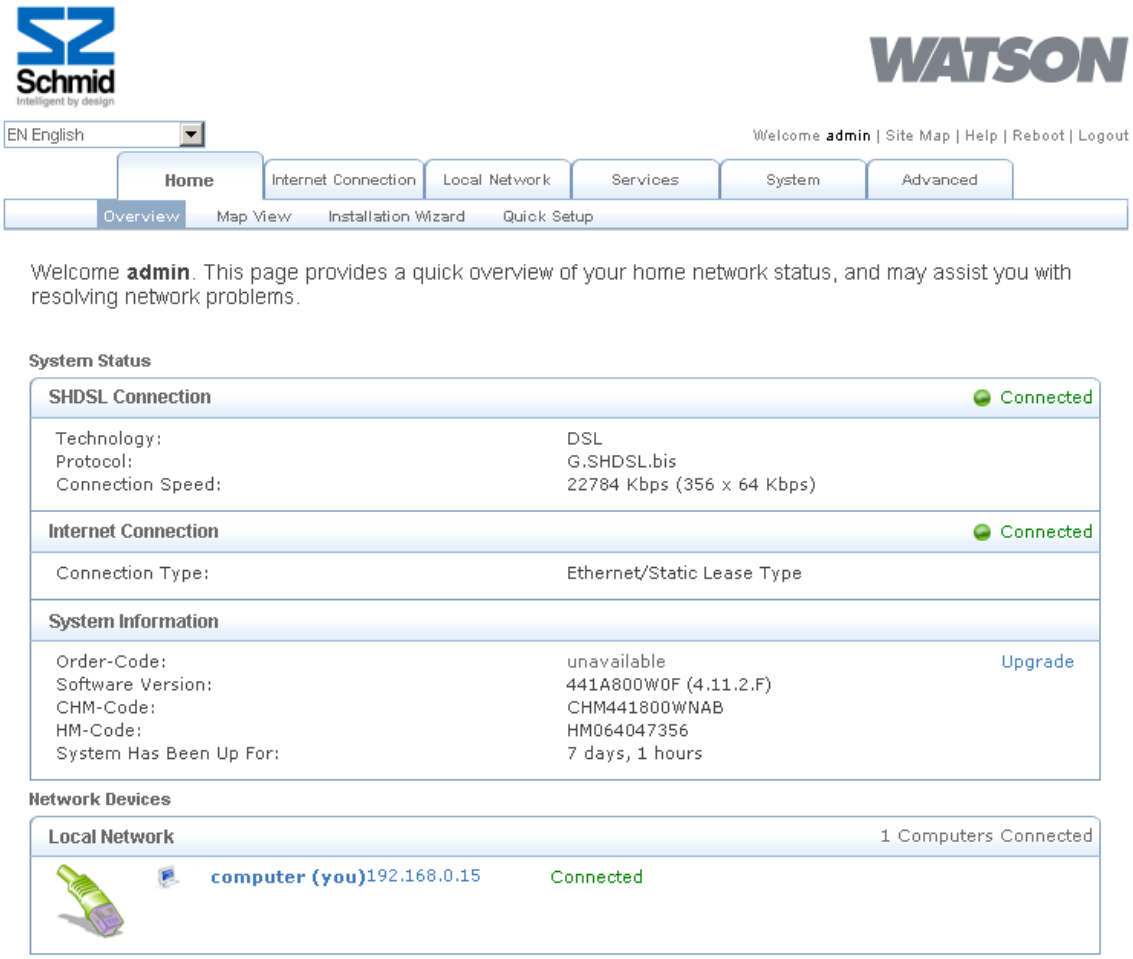


Figure 5-1: Watson Overview

5.2 Map View

The network map depicts the various network elements, such as the Internet connection, firewall, gateway, internal network interface and local network computers and peripherals.

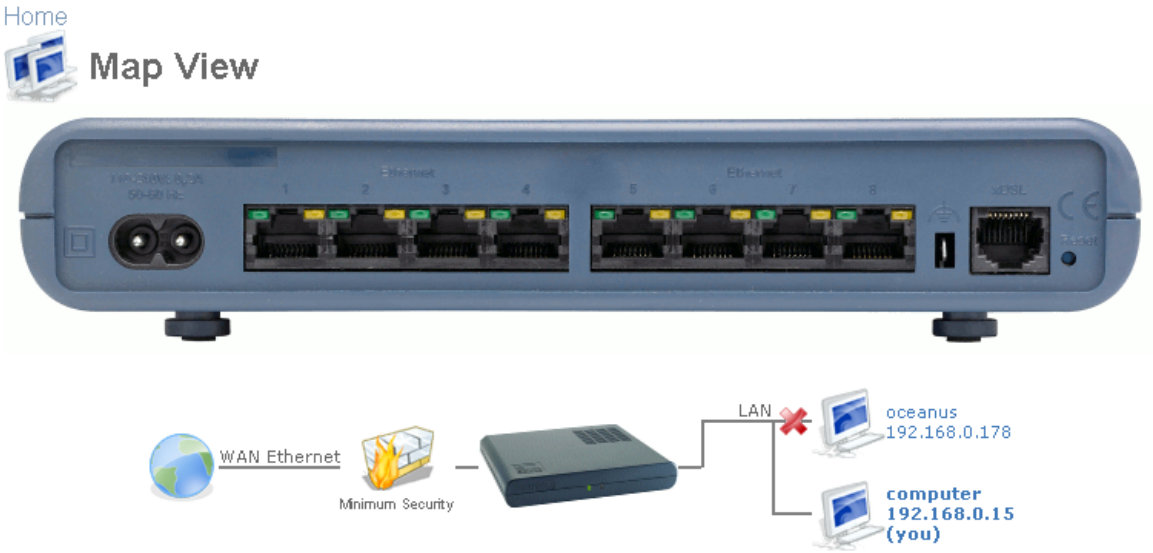


Figure 5-2: The Network Map

The following table explains the meaning of different network map symbols:

Represents the Internet. Click this icon to configure the SHDSL connction and the WAN interface (refer to Section 6.1).

Represents the gateway's Firewall. The height of the wall corresponds to the security level currently selected: Minimum, Typical or Maximum. Click this icon to configure the Firewall (refer to Section 8.2).

Represents the Watson SHDSL router. Click this icon to go to the System overview screen, showing the Software and Hardware version of Watson (refer to Section 9.1).

Represents a computer (host) connected in the home network. Each computer recognized and granted a DHCP lease appears on the network map. Click an icon to view network information for the corresponding computer.

5.3 Installation Wizard

Once your gateway is physically connected, Watson provides an Installation Wizard that automatically diagnoses your network environment and configures its components. As explained in its first screen, the installation wizard is a step-by-step procedure that guides you through establishing an Internet connection. The wizard

progress box, located at the right hand side of the screen, provides a monitoring tool for the wizard's steps during the installation progress.

Home
Installation Wizard
Local Network
Watson
Internet Connection
Wizard Progress
Analyze Internet Connection Type
Setup Internet Connection
Test Service Provider Connection
Test Internet Connection
Installation Completed
Welcome to Watson's step-by-step Installation Wizard. This wizard will guide you through your Internet connection and wireless network setup, and will help you to subscribe for services that are available to you as an Watson user. Please note that using the step-by-step installation wizard will override your existing gateway configuration.
To continue, click Next.
Next
Exit

Figure 5-3: Installation Wizard

To start the installation wizard, click 'Next'. The wizard procedure will start, performing the steps listed in the progress box consecutively, stopping only if a step fails or if input is required. The following sections describe the wizard steps along with their success/failure scenarios. If a step fails, use the 'Retry' or 'Skip' buttons to continue.

5.3.1 Step 1: Analyze Internet Connection Type

The first step is an analysis of your Internet connection.

Figure 5-4: Test Internet Connection

This step may fail if Watson cannot detect your Internet connection type or if your DSL connection is not established.

In this case, the screen changes to the following.

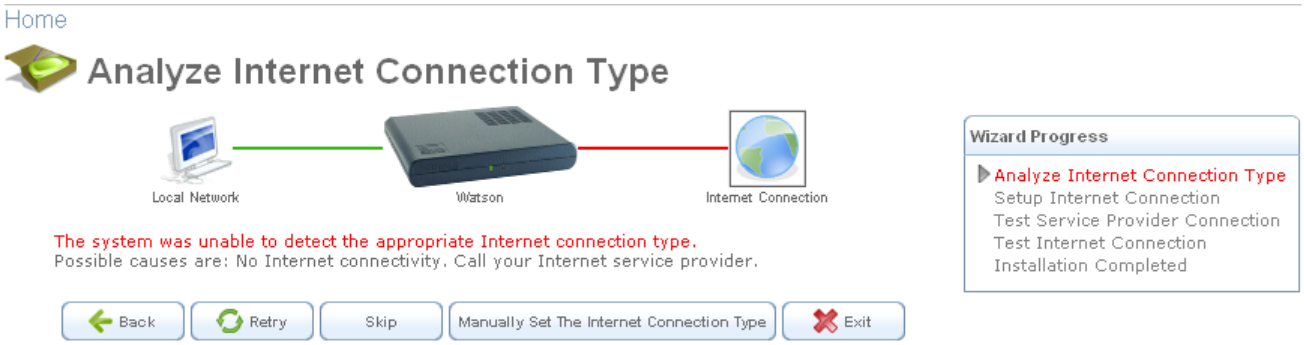


Figure 5-5: Test Internet Connection – Failure

In this case, you can manually set the Internet connection type, by clicking the corresponding button.

To learn about manually configuring your Internet connection, refer to Section 5.4.1.

5.3.2 Step 2: Setup Internet Connection

If your Internet connection requires login details provided by your Internet Service Provider (ISP) (e.g. when using PPPoE), enter your user name and password.

Failure to enter the correct details yields an error message. Click 'Back' and try again.

5.3.3 Step 3: Test Service Provider Connection

This step tests the connectivity to your ISP.

5.3.4 Step 4: Test Internet Connection

This step tests the connectivity to the Internet.

5.3.5 Step 5: Installation Completed

This screen provides a summary of all the above Internet connection configuration steps and their results. Click 'Finish' to complete the wizard procedure.

5.4 Quick Setup

'Quick Setup' enables speedy and accurate configuration of your Internet connection and other important parameters. The following sections describe these various configuration parameters. Whether you configure these parameters or use the default ones, click 'OK' to enable your Internet connection.

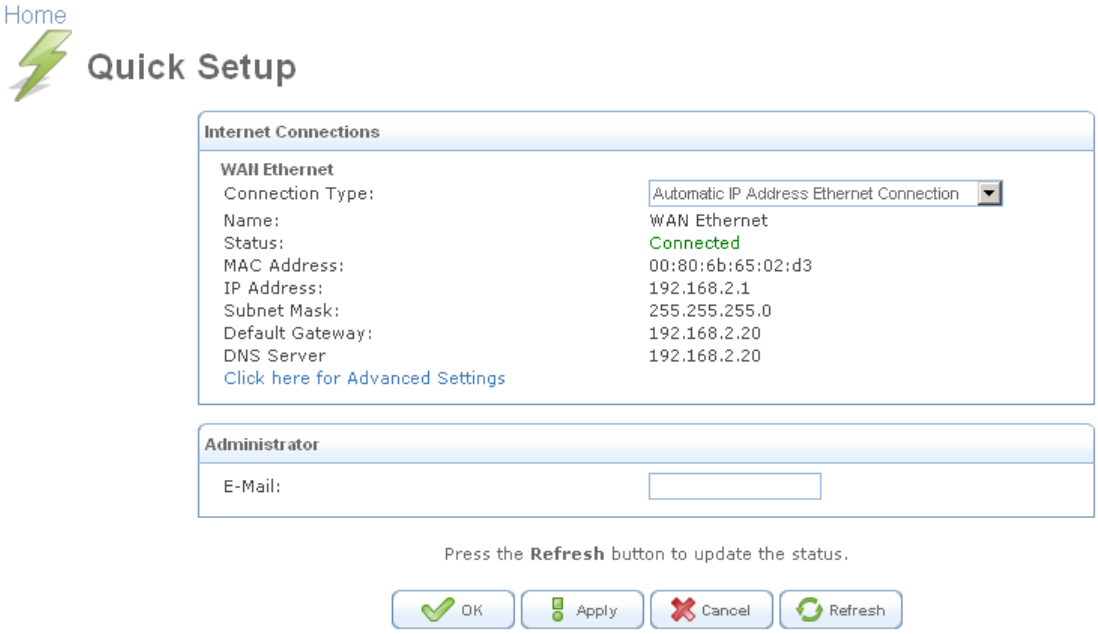


Figure 5-6: Quick Setup

5.4.1 Configuring Your Internet Connection

When subscribing to a broadband service, you should be aware of the method by which you are connected to the Internet. Technical information regarding the properties of your Internet connection should be provided by your Internet Service Provider (ISP). For example, your ISP should inform you whether you are connected to the Internet using a static or dynamic IP address, or what protocols, such as PPTP or PPPoE, you will be using to communicate over the Internet.

Your WAN connection can be configured using one of the following methods. Read the configuration instructions relevant to you, by selecting your connection method from the following list:

- Manual IP Address Ethernet Connection [Section 5.4.1.1]
- Automatic IP Address Ethernet Connection [Section 5.4.1.2]
- Point-to-Point Tunneling Protocol (PPTP) [Section 5.4.1.3]
- Point-to-point protocol over Ethernet (PPPoE) [Section 5.4.1.4]
- No Internet connection [Section 5.4.1.5]

Click the 'Click here for Advanced Settings' link at anytime to navigate to your WAN connection's properties page. The 'WAN Ethernet Properties' screen appears.

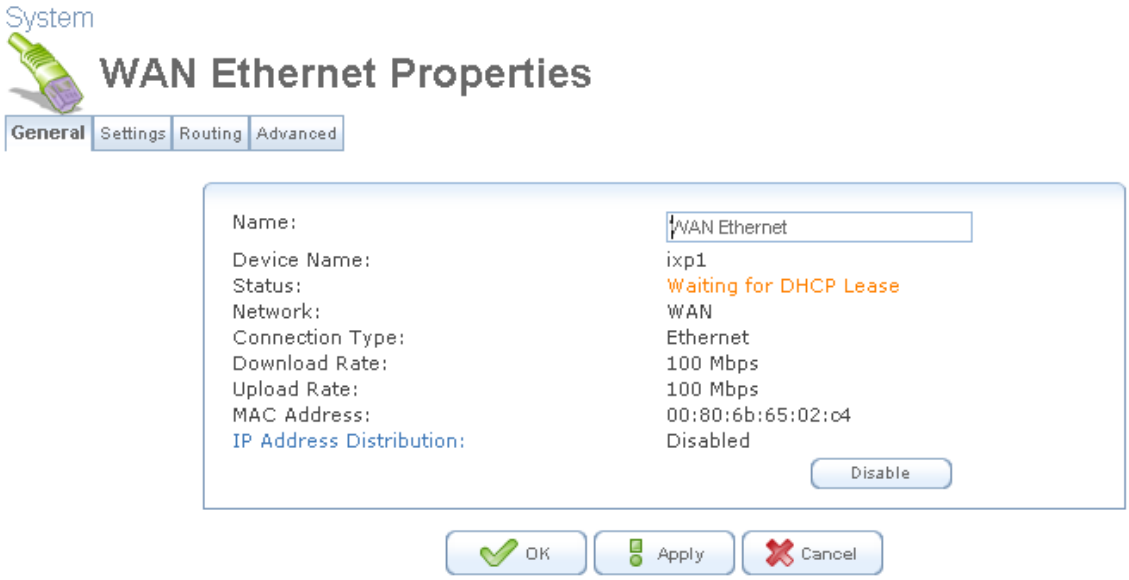


Figure 5-7: WAN Ethernet Properties

This screen provides all the configuration options for your WAN connection. For more information, refer to Section 9.4.3.

5.4.1.1 Manual IP Address Ethernet Connection

Select 'Manual IP Address Ethernet Connection' from the 'Connection Type' combo box:

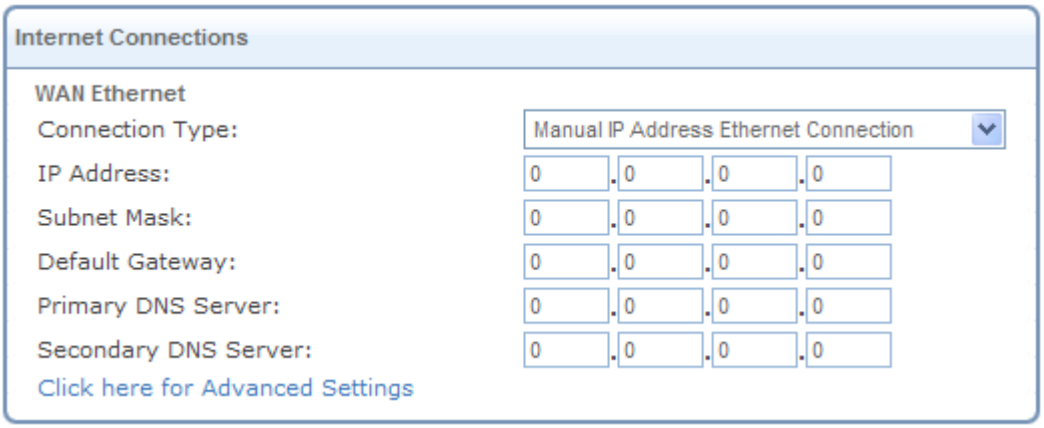


Figure 5-8: Internet Connection - Manual IP Address Ethernet Connection

According to your service provider's instructions, specify the following parameters:

- IP address
- Subnet mask
- Default gateway
- Primary DNS server
- Secondary DNS server

5.4.1.2 Automatic IP Address Ethernet Connection

Select 'Automatic IP Address Ethernet Connection' from the 'Connection Type' combo-box (see Figure 5-9). Watson will obtain the WAN IP and DNS IP addresses from a DHCP server on the WAN.

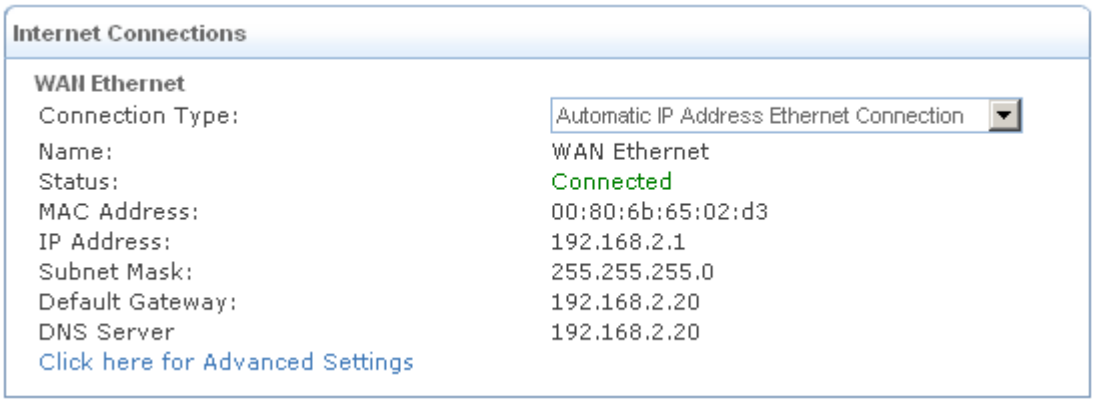


Figure 5-9: Internet Connection - Automatic IP Address Ethernet Connection

5.4.1.3 Point-to-Point Tunneling Protocol (PPTP)

Select 'Point-to-Point Tunneling Protocol (PPTP)' from the 'Connection Type' combo box:

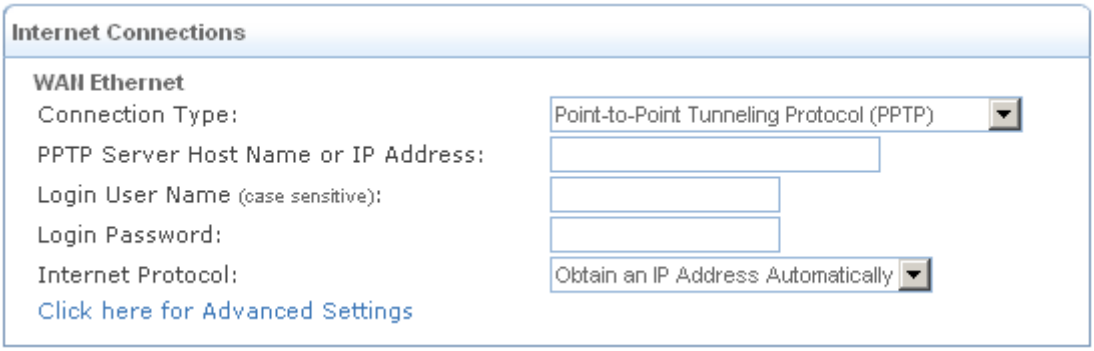


Figure 5-10: Internet Connection - PPTP

Configure the following parameters according to your ISP information:

- PPTP Server Host Name or IP Address
- Login User Name
- Login Password

Select the Internet Protocol: Most Internet Service Providers (ISPs) provide dynamic IP addresses, hence the default "Obtain an IP Address Automatically". Should this not be the case, select the "Use the Following IP Address" option. The screen refreshes. Enter the IP Address, Subnet Mask, and Default Gateway provided to you by your ISP.

Figure 5-11: PPTP - Static IP Address

5.4.1.4 Point-to-point protocol over Ethernet (PPPoE)

Select 'Point-to-point protocol over Ethernet (PPPoE)' from the 'Connection Type' combo box:

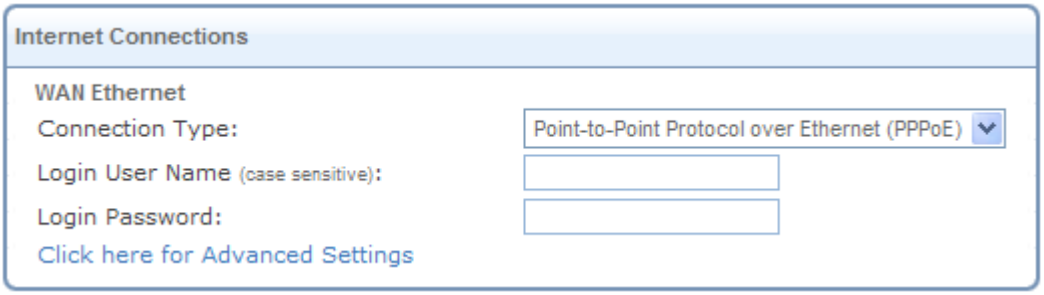


Figure 5-12: Internet Connection - PPPoE

Your Internet Service Provider (ISP) should provide you with the following information:

- Login user name
- Login password

5.4.1.5 No Internet Connection

Select 'No Internet Connection' from the 'Connection Type' combo-box (see Figure 5-13). Choose this connection type if you do not have an Internet connection, or if you want to disable all existing connections.

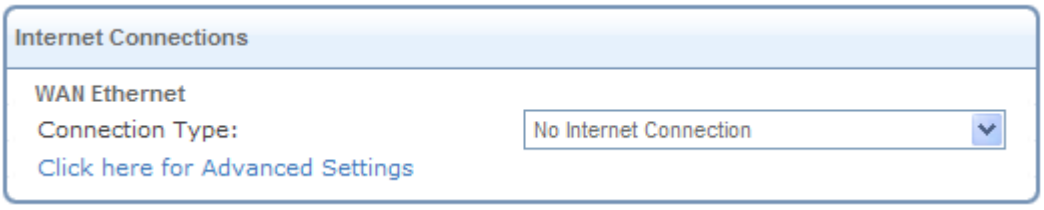


Figure 5-13: Internet Connection - No Internet Connection

5.4.2 Quick Setup Completed

Watson does not require further configuration in order to start working. After the setup described in this chapter, you can immediately start using your gateway to:

- Share a broadband connection among multiple users (HTTP, FTP, Telnet, NetMeeting) and between all of the computers connected to your home network.
- Build a home network by connecting additional PCs and network devices to the gateway.
- Share resources (file servers, printers, etc.) between computers in the home network using their names; auto-learning DNS enables Watson to automatically detect the network identification names of the LAN PCs, enabling mutual communication using names, not IP addresses.
- Control network parameters, including DHCP, DNS and WAN settings.
- View network status, traffic statistics, system log and more.
- Allow access from the Internet to services provided by computers in the home network.
- Prohibit computers in the home network from accessing selected services on the Internet.
- Block access to specific Internet Web sites from your home network.

To learn about how to configure your Firewall security parameters, refer to Section 8.2. If you wish to apply corporate-grade security to your network, refer to Section 8.2.11. If your gateway is equipped with multiple LAN ports, you can connect additional devices directly to the gateway. Otherwise, connect a hub or switch to the LAN port, to which you can connect additional devices. In both cases, configure newly connected devices to automatically obtain IP address as described above.

6 Internet Connection

6.1 Overview

The 'Overview' screen provides general information regarding your SHDSL Connection and your Internet conncetion such as DSL link status, connection speed, internet connection's status, connection duration, and Internet address. Refer to this screen for a quick status reference.

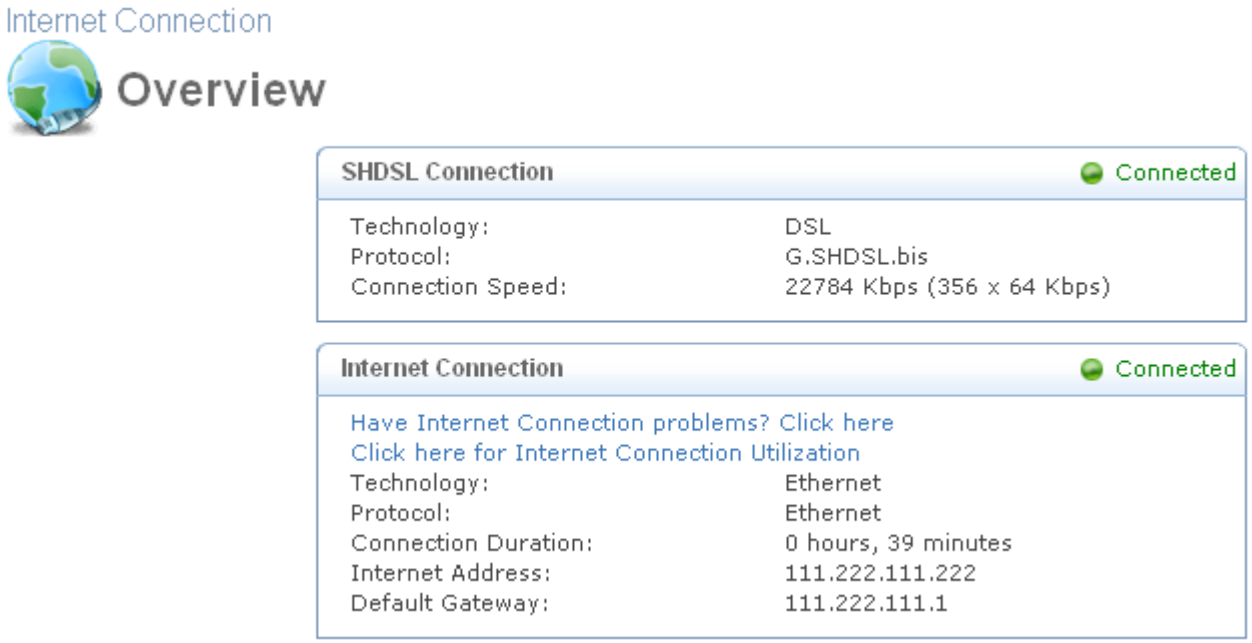


Figure 6-1: Internet Connection – Overview

The following links are available:

- **Have Internet Connection problems? Click here** This link routes you to the 'Diagnostics' screen under the 'Internet Connection' tab, where you can run tests in order to diagnose and resolve Internet connectivity problems (for more information, refer to Section 6.3).
- **Click Here For Internet Connection Utilization** Click this link to analyze the traffic usage of your WAN connection (for more information, refer to Section 8.3.2).

6.2 Settings

The 'Settings' screen provides basic configuration options for the SHDSL modem and for the different types of Internet connections supported by Watson.

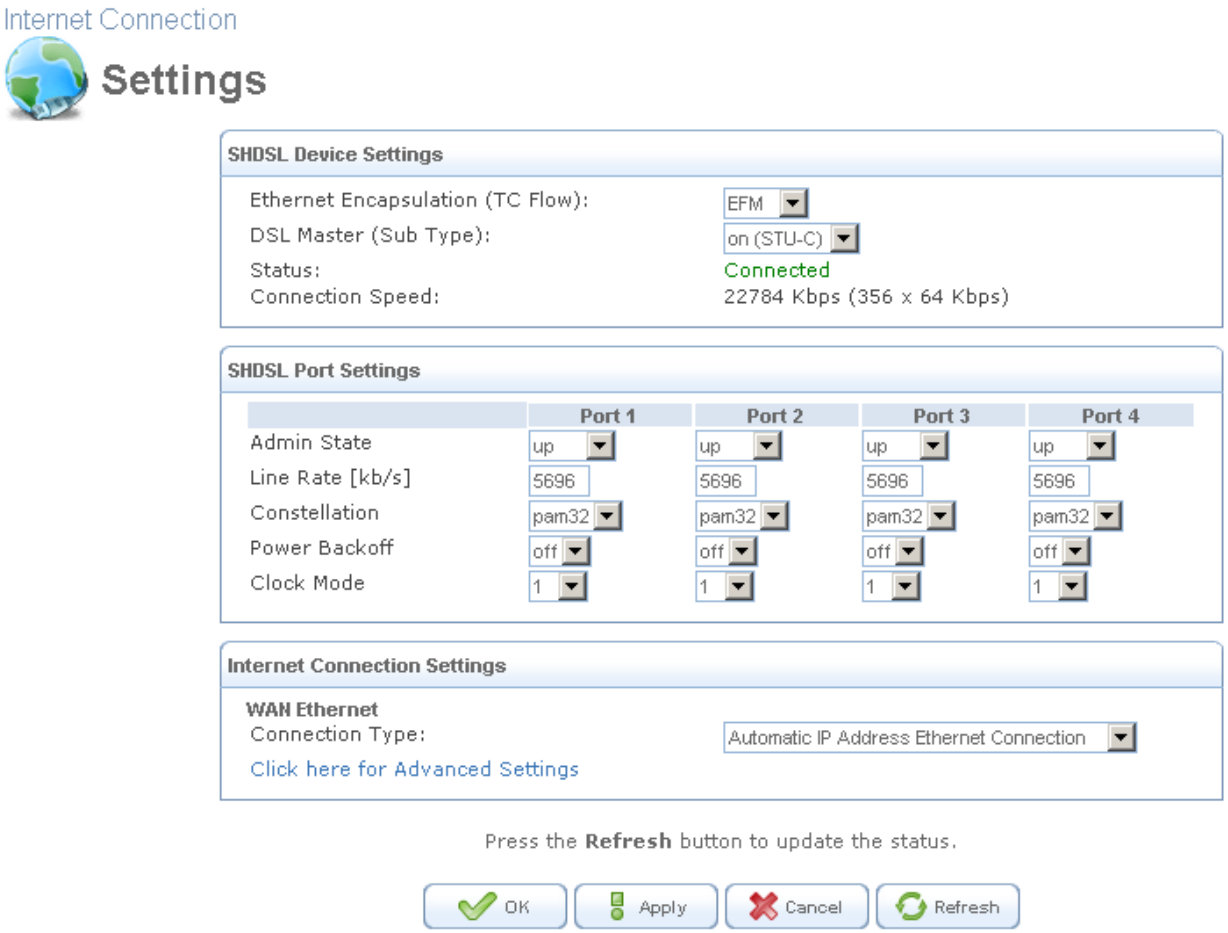


Figure 6-2: Internet Connection – Settings

Ethernet Encapsulation (TC Flow) Select either ’EFM’ or ’HDLC’ encapsulation. ‘HDLC’ encapsulation should be selected when the Watson SHDSL router is connected to a another Watson modem supporting ‘HDLC’ encapsulation. ‘EFM’ should be selected when two Watson SHDSL routers are connected point-to-point together or when the Watson SHDSL router is connected to another SHDSL EFM compatible device.

DSL Master (Sub Type) Select ‘off (STU-R)’ or ‘on (STU-C)’. If two Watson SHDSL router are connected point-to-point, one device has to be set to ‘off’ and the other device has to be set to ‘on’. Use ‘off (STU-R)’ when the Watson SHDSL router is connected to a Watson Ethernet plug-in (SZ.866.V654) [2]. Some DSL port settings are only visible when DSL Master is ‘on (STU-C)’.

Admin State Select ‘up’ or ‘down’. Allows to block certain ports and alarms.

Line Rate [kb/s] Enter the line rate of the ports.

Constellation Select ‘pam16’ or ‘pam32’ or ‘pam64’ or ‘pam128’ .

Power Backoff Select ‘on’ or ‘off’. Default is ‘off’. For short distances you can turn it on to reduce the transmitted power.

Clock Mode To connect to other Schmid Telecom Watson devices use the default clock mode ‘1’. If needed, choose another clock mode when connected to an SHDSL EFM device from another manufacturer.

WAN Ethernet Connection Type Select your WAN connection type according to the method by which you are connected to the Internet. Each option in this drop-down menu is described thoroughly in Section 5.4.1.

Click the 'Click here for Advanced Settings' link to navigate to your WAN connection's properties page. The 'WAN Ethernet Properties' screen appears.

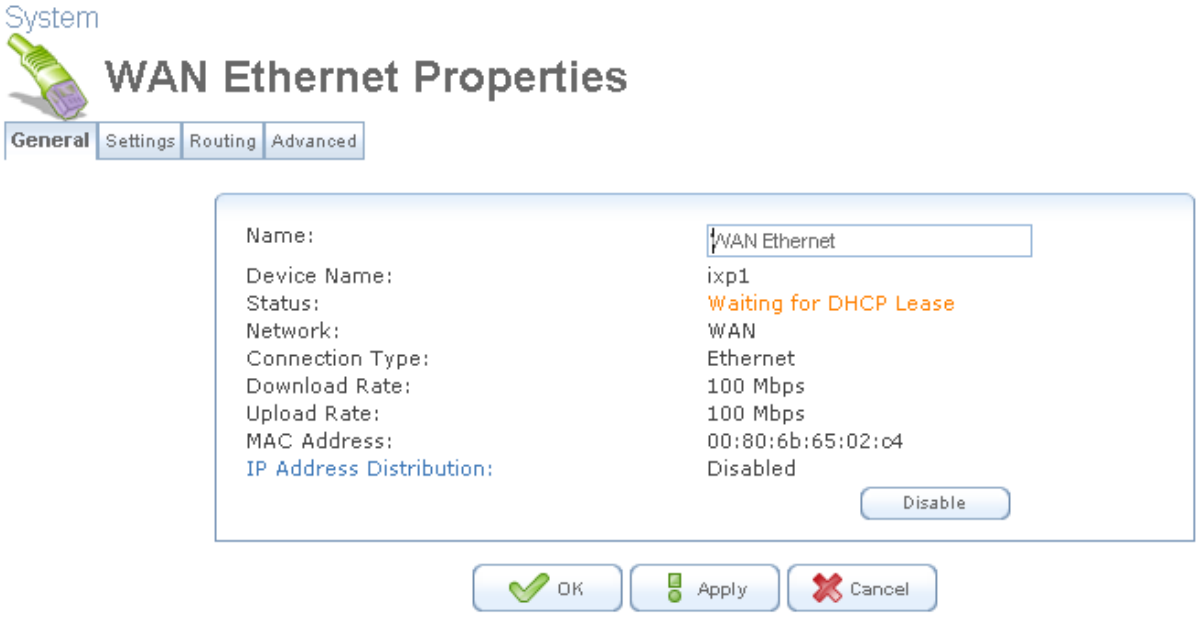


Figure 6-3: WAN Ethernet Properties

This screen provides all the configuration options for your WAN connection. For more information, refer to Section 9.4.3.

6.3 Diagnostics

The 'Diagnostics' screen provides a series of tests aimed at validating your gateway's Internet connection.

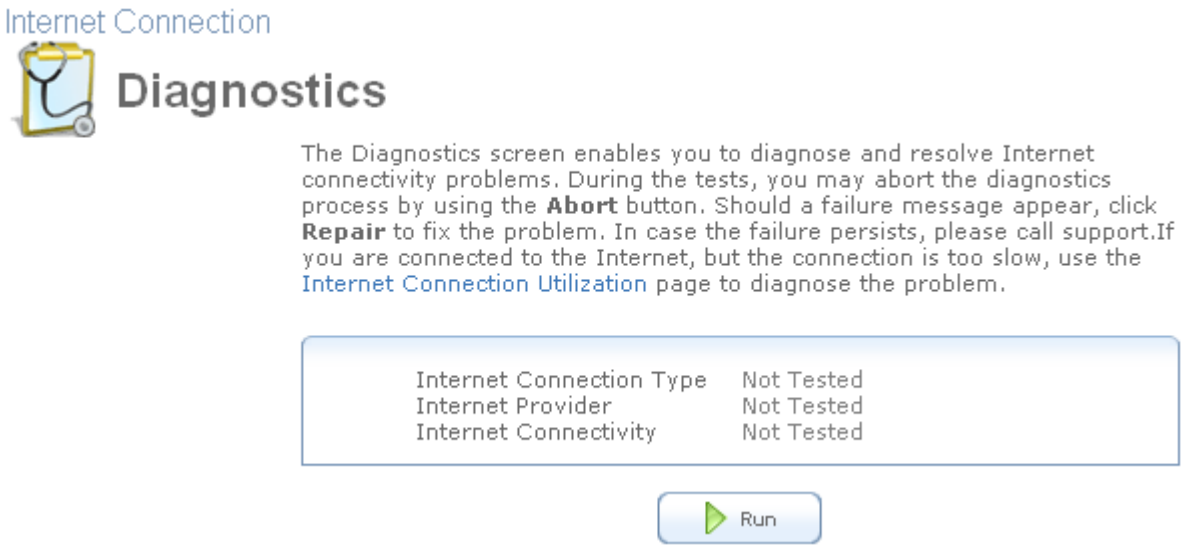

Internet Connection
Diagnostics
The Diagnostics screen enables you to diagnose and resolve Internet connectivity problems. During the tests, you may abort the diagnostics process by using the Abort button. Should a failure message appear, click Repair to fix the problem. In case the failure persists, please call support.If you are connected to the Internet, but the connection is too slow, use the Internet Connection Utilization page to diagnose the problem.
Internet Connection Type Not Tested
Internet Provider Not Tested
Internet Connectivity Not Tested
Run

Figure 6-4: Internet Connection – Diagnostics

Click 'Run' to begin the test routine. While testing is in progress, you may abort the diagnostics process by using the 'Abort' button. Should a failure message appear, click 'Repair' to initiate the Installation Wizard procedure (refer to Section 5.3).

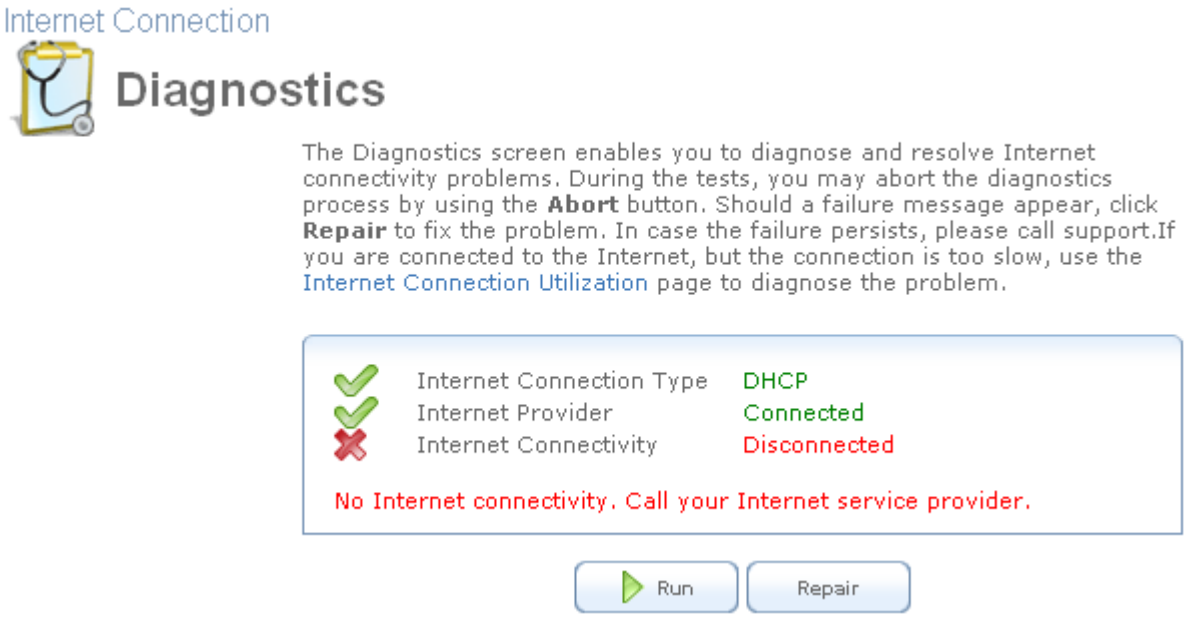

Internet Connection
Diagnostics
The Diagnostics screen enables you to diagnose and resolve Internet connectivity problems. During the tests, you may abort the diagnostics process by using the Abort button. Should a failure message appear, click Repair to fix the problem. In case the failure persists, please call support.If you are connected to the Internet, but the connection is too slow, use the Internet Connection Utilization page to diagnose the problem.
Internet Connection Type DHCP
Internet Provider Connected
Internet Connectivity Disconnected
No Internet connectivity. Call your Internet service provider.
Run
Repair

Figure 6-5: Diagnostics Process

6.4 SHDSL Status

The 'SHDSL Status' screen provides the SHDSL port status and performance.

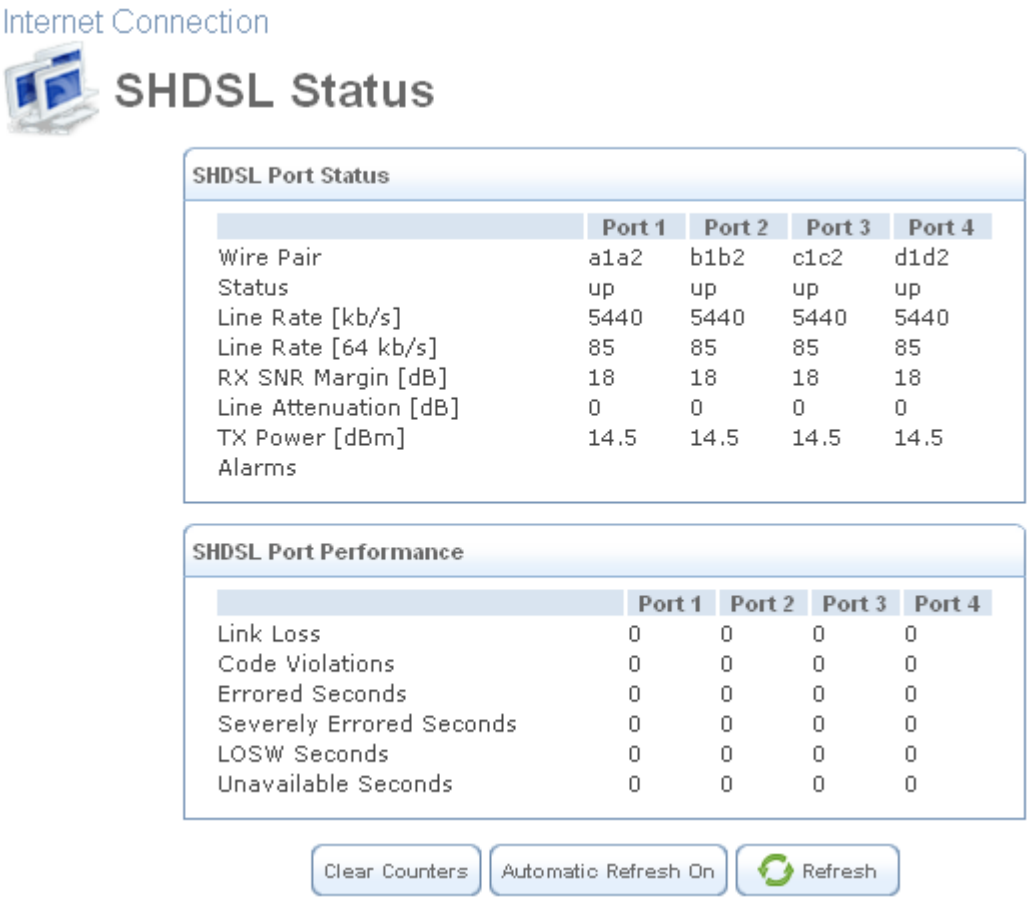

Internet Connection
SHDSL Status
SHDSL Port Status
Port 1 Port 2 Port 3 Port 4
Wire Pair a1a2 b1b2 c1c2 d1d2
Status up up up up
Line Rate [kb/s] 5440 5440 5440 5440
Line Rate [64 kb/s] 85 85 85 85
RX SNR Margin [dB] 18 18 18 18
Line Attenuation [dB] 0 0 0 0
TX Power [dBm] 14.5 14.5 14.5 14.5
Alarms
SHDSL Port Performance
Port 1 Port 2 Port 3 Port 4
Link Loss 0 0 0 0
Code Violations 0 0 0 0
Errored Seconds 0 0 0 0
Severely Errored Seconds 0 0 0 0
LOSW Seconds 0 0 0 0
Unavailable Seconds 0 0 0 0
Clear Counters
Automatic Refresh On
Refresh

Figure 6-6: Internet Connection – SHDSL Status

Note: an important value to monitor is the 'RX SNR Margin'. The RX SNR Margin should no be smaller than 4 dB to garanty good and reliable SHDSL performance. If the value is too small the linerate should be reduced to increase the RX SNR Margin.

Click 'Clear Counters' to reset the performance counters.

7 Local Network

7.1 Overview

The 'Overview' screen presents your local network summary. This includes all connected devices. When this screen is loaded, Watson begins the process of automatically detecting the network services available on connected computers (hosts).

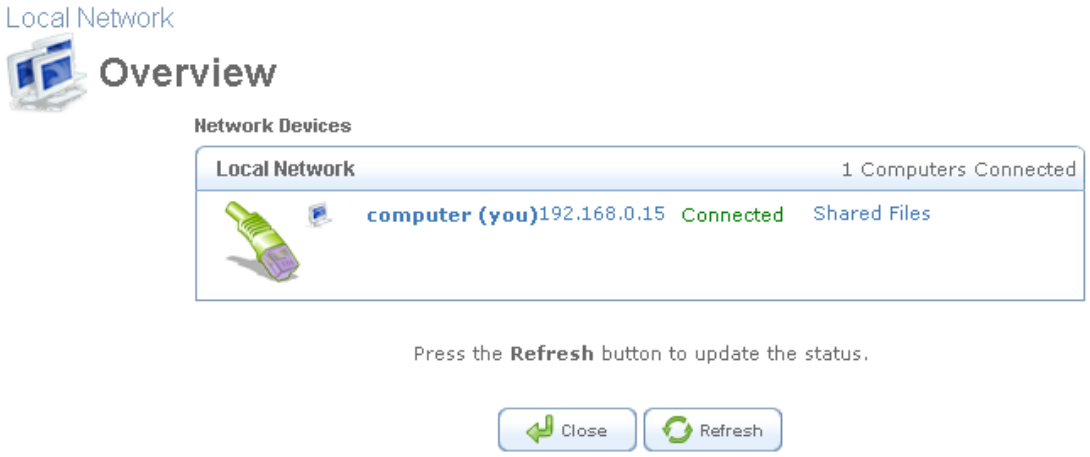


Figure 7-1: Local Network Overview

To view more information on a specific computer, click its respective link. The 'Host Information' screen appears.

Figure 7-2: Host Information

This screen presents all of the information relevant to the connected computer, such as connection information, available services, traffic statistics, and connection list. It also enables you to perform connectivity tests with the computer.

Services This section lists the services on the computer that are available to other computers from the LAN. Services are accessible only when enabled on the computer. When a service is accessible from the LAN, you can activate it by either clicking its name or the URL that appears. Available services are:

- **Shared Files** Access the computer's shared files directory.
- **HTTP** Access the computer's HTTP server (if available).
- **FTP** Open an FTP session with the computer.
- **Telnet** Open a Telnet session with the computer.
- **Remote Desktop** Remotely control a Windows computer with the Remote Desktop utility.
- **VNC** Remotely control the computer with the Virtual Network Computing desktop protocol.
- **Add Access Control Rule** Block access to Internet services from the computer, or allow access if the firewall is set to a "High" security level (for more information, refer to Section 8.2.2).
- **Add Port Forwarding Rule** Expose services on the computer to external Internet users (for more information, refer to Section 8.2.3).

Connection Information This section displays various details regarding the computer's connection settings. To view the connection's properties, click the network connection type ('Bridge' in the above example). The relevant properties

screen appears (for more information, refer to Section 9.4). In addition, you can run a Ping or ARP test by clicking the respective 'Test Connectivity' button. The tests are performed in the 'Diagnostics' screen (refer to Section 9.8.8).

Statistics This section displays the computer's traffic statistics, such as the number and size of transmitted and received packets.

Connection List This section displays the list of connections opened by the computer on Watson's firewall. The table displays the computer's source LAN IP address and port, the gateway's IP address and port to which it is translated, and the destination WAN IP address and port.

7.2 Device View

The 'Device View' screen presents a summary of Watson's LAN devices and the status of each one (connected/disconnected).

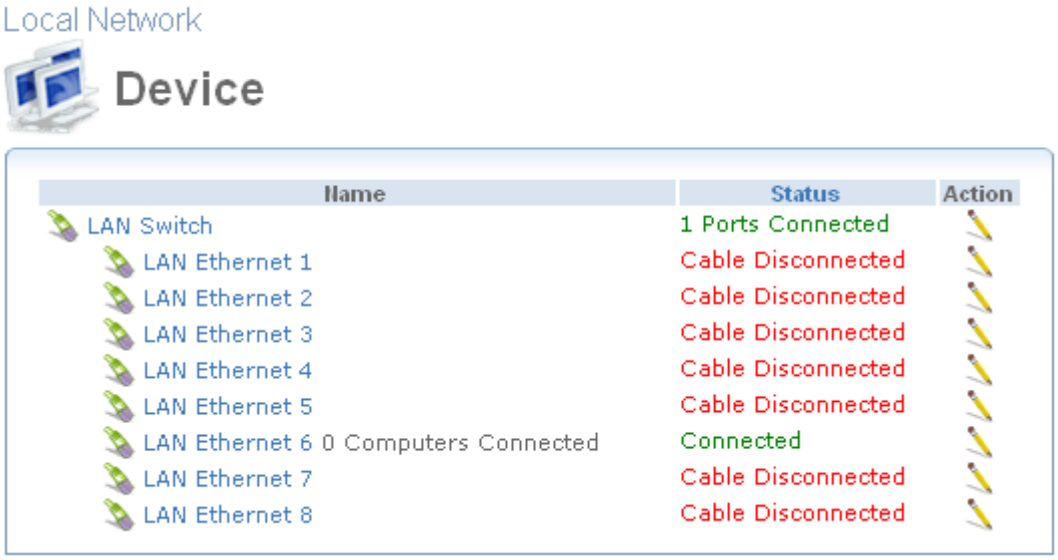


Figure 7-3: Local Network Device View

8 Services

8.1 Overview

The 'Overview' screen presents a summary of Watson's services and their current status (enabled/disabled). These services are configurable via their respective tabs under the 'Services' main tab.

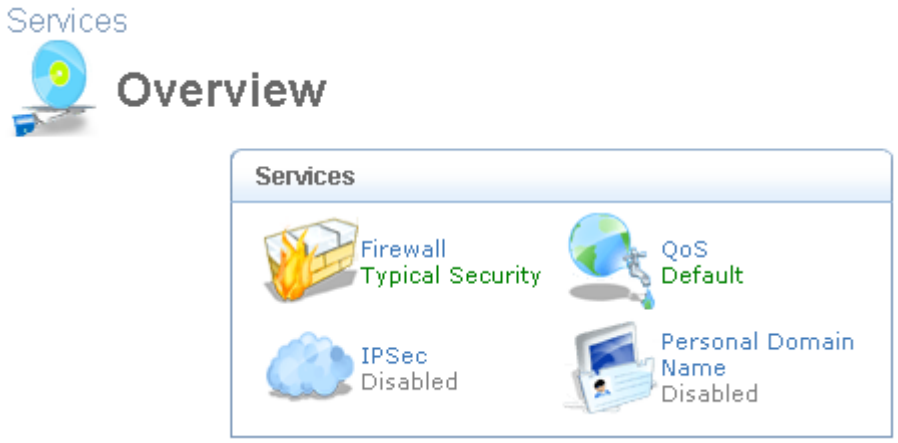


Figure 8-1: Services Overview

8.2 Firewall

Watson's gateway security suite includes comprehensive and robust security services: Stateful Packet Inspection Firewall, user authentication protocols and password protection mechanisms. These features together allow users to connect their computers to the Internet and simultaneously be protected from the security threats of the Internet. The firewall has been pre-configured to provide optimum security.

Watson's firewall provides provides a managed, professional level of network security while enabling the safe use of interactive applications.

Additional features, including surfing restrictions and access control, can also be easily configured locally by the user through a user-friendly Web-based interface, or remotely by a service provider. The Watson firewall supports advanced filtering, designed to allow comprehensive control over the firewall's behavior. You can define specific input and output rules, control the order of logically similar sets of rules and make a distinction between rules that apply to WAN and LAN network devices.

The Firewall service includes the following management screens:

- The **'Overview'** screen allows you to choose the security level for the firewall (refer to Section 8.2.1)
- The **'Access Control'** screen can be used to restrict access from the home network to the Internet (refer to Section 8.2.2).
- The **'Port Forwarding'** screen can be used to enable access from the Internet to specified services provided by computers in the home network and special Internet applications (refer to Section 8.2.3).
- The **'DMZ Host'** screen allows you to configure a LAN host to receive all traffic arriving at your gateway, which does not belong to a known session (refer to Section 8.2.4
- The **'Port Triggering'** screen allows you to define port triggering entries, to dynamically open the firewall for some protocols or ports (refer to Section 8.2.5).
- The **'Website Restrictions'** screen allows you to block LAN access to a certain host or Web site on the Internet (refer to Section 8.2.6).
- The **'NAT'** screen allows you to manually control the translation of network addresses and ports (refer to Section 8.2.7).
- The **'Connections'** screen allows you to view all the connections that are currently open (refer to Section 8.2.8).
- The **'Advanced Filtering'** screen allows you to implicitly control the firewall setting and rules (refer to Section 8.2.9).
- The **'Log'** screen allows you to view and configure the firewall Log (refer to Section 8.2.9.2).

8.2.1 Overview

Use the 'General' screen to configure the gateway's basic security settings.

Firewall
General
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Maximum Security
Inbound Policy: Reject.
Remote Administration settings will override the security inbound policy.
Outbound Policy: Reject.
Outbound access is allowed to the following services: DHCP, DNS, IMAP, SMTP, POP3, HTTPS, HTTP, FTP, Telnet.
Typical Security
Inbound Policy: Reject.
Remote Administration settings will override the security inbound policy.
Outbound Policy: Accept.
Minimum Security
Inbound Policy: Accept.
Outbound Policy: Accept.
Block IP Fragments
OK
Apply
Cancel

Figure 8-2: General

The firewall regulates the flow of data between the home network and the Internet. Both incoming and outgoing data are inspected and then either accepted (allowed to pass through Watson) or rejected (barred from passing through Watson) accord-

ing to a flexible and configurable set of rules. These rules are designed to prevent unwanted intrusions from the outside, while allowing home users access to the Internet services that they require.

The firewall rules specify what types of services available on the Internet may be accessed from the home network and what types of services available in the home network may be accessed from the Internet. Each request for a service that the firewall receives, whether originating in the Internet or from a computer in the home network, is checked against the set of firewall rules to determine whether the request should be allowed to pass through the firewall. If the request is permitted to pass, then all subsequent data associated with this request (a "session") will also be allowed to pass, regardless of its direction.

For example, when you point your Web browser to a Web page on the Internet, a request is sent out to the Internet for this page. When the request reaches Watson the firewall will identify the request type and origin–-HTTP and a specific PC in your home network, in this case. Unless you have configured access control to block requests of this type from this computer, the firewall will allow this request to pass out onto the Internet (refer to Section 8.2.2 for more on setting access controls). When the Web page is returned from the Web server the firewall will associate it with this session and allow it to pass, regardless of whether HTTP access from the Internet to the home network is blocked or permitted. The important thing to note here is that it is the origin of the request, not subsequent responses to this request, that determines whether a session can be established or not. These services include Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3 and SMTP. The list of allowed services at 'Maximum Security' mode can be edited in the Access Control page. Attention: Some applications (such as some Internet messengers and Peer-To-Peer client applications) tend to use these ports, if they cannot connect with their own default ports. When applying this behavior, these applications will not be blocked outbound, even at Maximum Security Level.

To configure Watson's security settings, perform the following:

1. Choose between the three predefined security levels described in the table above.

Note: Using the Minimum Security setting may expose the home network to significant security risks, and thus should only be used, when necessary, for short periods of time.

2. Check the 'Block IP Fragments' box in order to protect your home network from a common type of hacker attack that could make use of fragmented data packets to sabotage your home network. Note that VPN over IPSec and some UDP-based services make legitimate use of IP fragments. You will need to allow IP fragments to pass into the home network in order to make use of these select services.
3. Click 'OK' to save the settings.

8.2.2 Access Control

You may want to block specific computers within the home network (or even the whole network) from accessing certain services on the Internet. For example, you may want to prohibit one computer from surfing the Web, another computer from transferring files using FTP, and the whole network from receiving incoming e-mail.

Access Control defines restrictions on the types of requests that may pass from the home network out to the Internet, and thus may block traffic flowing in both directions. It can also be used for allowing specific services when maximum security is configured. In the e-mail example given above, you may prevent computers in the home network from receiving e-mail by blocking their outgoing requests to POP3 servers on the Internet. There are numerous services you should consider blocking, such as popular game and file sharing servers. For example, if you want to make sure that your employees do not put your business at risk from illegally traded copyright files, you may want to block several popular P2P and file sharing applications.

To allow or restrict services:

- Click 'Access Control' under the Firewall menu. The 'Access Control' screen appears.

Figure 8-3: Access Control

- Click the 'New Entry' link. The 'Add Access Control Rule' screen appears.

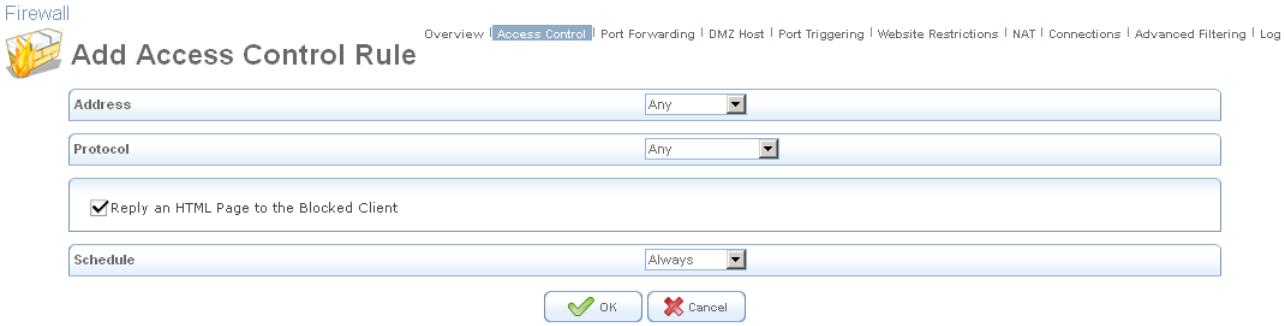


Figure 8-4: Add Access Control Rule

- The '**Address**' drop-down menu provides you the ability to specify the computer or group of computers for which you would like to apply the access control rule. You can select between any, a specific computer in your LAN, or 'User Defined'. If you choose the 'User Defined' option, the 'Edit Network Object' screen appears. Specifying an address is done by creating a 'Network Object'; to learn more about network objects, refer to Section 9.9.2.

- The ‘**Protocol’** drop-down menu menu lets you select or specify the type of protocol that will be used. Selecting the 'Show All Services' option will expand the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This will commence a sequence that will add a new service, representing the protocol. Refer to Section 9.9.1 in order to learn how to do so.
- Select the 'Reply an HTML page to the blocked client' check-box to display the following message to the client: "Access Denied - this computer is not allowed to surf the WAN. Please contact your admin.". When this check box is unselected, the client's packets are simply ignored and no notification is issued.
- The **'Schedule'** drop-down menu allows you to define the time period during which this rule will take effect. By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined'. To learn how to configure scheduler rules, refer to Section 9.9.3.
- Click the 'OK' button to save your changes. The 'Access Control' screen displays a summary of the rule that you just added.

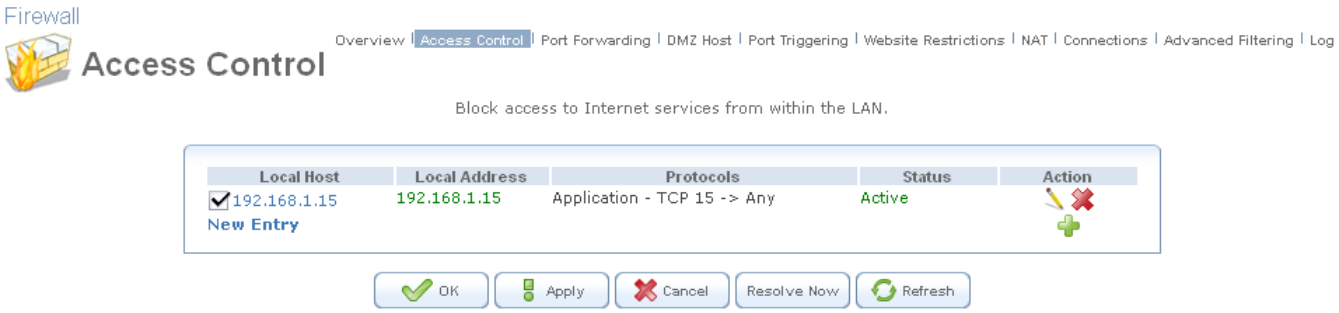


Figure 8-5: Access Control Rule

You may edit the access control rule by modifying its entry under the 'Local Host' column in the 'Access Control' screen.

To modify an entry:

- Click the action icon for the rule. The 'Edit Access Control Rule' screen appears. This screen allows you to edit all the parameters that you configured when creating the access control rule.

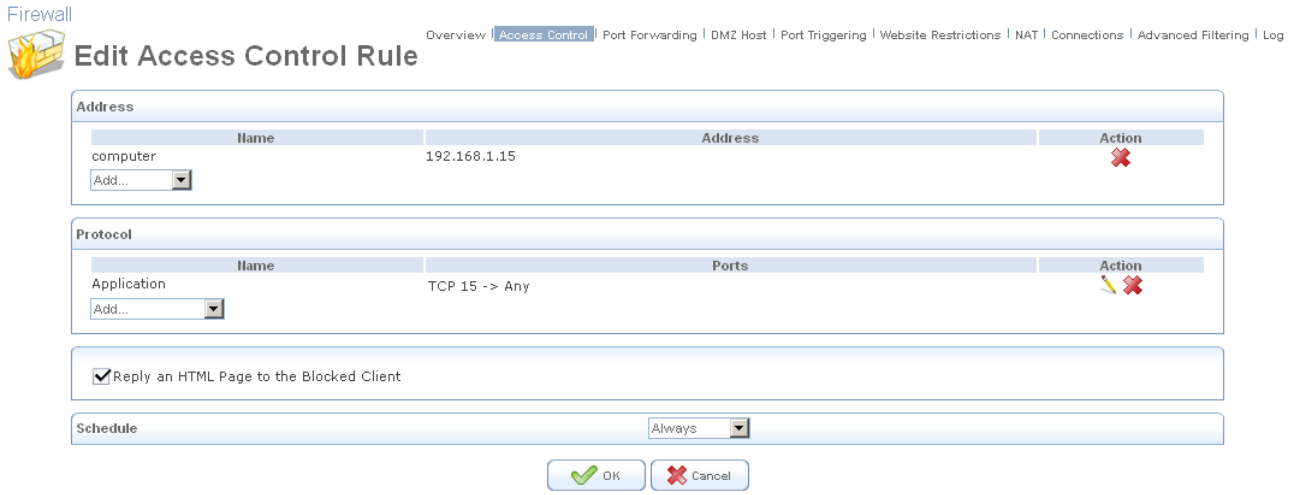


Figure 8-6: Edit Access Control Rule

- Click the 'OK' button to save your changes and return to the 'Access Control' screen.

You can disable an access control rule in order to make a service available without having to remove the rule from the 'Access Control' screen. This may be useful if you wish to make the service available only temporarily and expect that you will want to reinstate the restriction in the future.

- To temporarily disable a rule, clear the check box next to the service name.
- To reinstate it at a later time, simply reselect the check box.
- To remove a rule, click the action icon for the service. The service will be permanently removed.

Please note that when Web Filtering is enabled, HTTP services cannot be blocked by Access Control.

8.2.3 Port Forwarding

In its default state, Watson blocks all external users from connecting to or communicating with your network. Therefore the system is safe from hackers who may try to intrude on the network and damage it. However, you may want to expose your network to the Internet in certain limited and controlled ways in order to enable some applications to work from the LAN (game, voice and chat applications, for example) and to enable Internet-access to servers in the home network. The Port Forwarding feature supports both of these functionalities. If you are familiar with networking terminology and concepts, you may have encountered this topic referred to as "Local Servers".

The 'Port Forwarding' screen enables you to define the applications that require special handling by Watson. All you have to do is select the application's protocol and the local IP address of the computer that will be using or providing the service. If required, you may add new protocols in addition to the most common ones provided by Watson. For example, if you wanted to use a File Transfer Protocol (FTP) application on one of your PCs, you would simply select 'FTP' from the list and enter the local IP address or host name of the designated computer. All FTP-related data arriving at Watson from the Internet will henceforth be forwarded to the specified computer.

Similarly, you can grant Internet users access to servers inside your home network, by identifying each service and the PC that will provide it. This is useful, for example, if you want to host a Web server inside your home network. When an Internet user points his/her browser to Watson's external IP address, the gateway will forward the incoming HTTP request to your Web server.

However, there is a limitation that must be considered. With one external IP address (Watson's main IP address), different applications can be assigned to your LAN computers, however each type of application is limited to use one computer. For example, you can define that FTP will use address X to reach computer A and Telnet will also use address X to reach computer A, but attempting to define FTP to use address X to reach both computer A and B will fail. Watson therefore provides the ability to add additional public IP addresses to port forwarding rules, which you must first obtain from your ISP, and enter into the 'NAT IP Addresses Pool' (refer to Section 8.2.7). You will then be able to define FTP to use address X to reach computer A and address Y to reach computer B.

Additionally, port forwarding enables you to redirect traffic to a different port instead of the one to which it was designated. For example, you have a Web server running on your PC on port 8080 and you want to grant access to this server to anyone who accesses Watson via HTTP. To accomplish this, you will have to define a port forwarding rule for the HTTP service, with the PC's IP or host name, as well as specify 8080 in the 'Forward to Port' field. All incoming HTTP traffic will now be forwarded to the PC running the Web server on port 8080.

When setting a port forwarding service, you must ensure that the port is not already in use by another application, which may stop functioning.

Note: Some applications, such as FTP, TFTP, PPTP and H323, require the support of special specific Application Level Gateway (ALG) modules in order to work inside the home network. Data packets associated with these applications contain information that allows them to be routed correctly. An ALG is needed to handle these packets and ensure that they reach their intended destinations. Watson is equipped with a robust list of ALG modules in order to enable maximum functionality in the home network. The ALG is automatically assigned based on the destination port.

To add a new port forwarding service, perform the following:

- Click 'Port Forwarding' under the Firewall menu. The 'Port Forwarding' screen appears.

Figure 8-7: Port Forwarding

- Click the 'New Entry' link. The 'Add Port Forwarding Rule' screen appears.

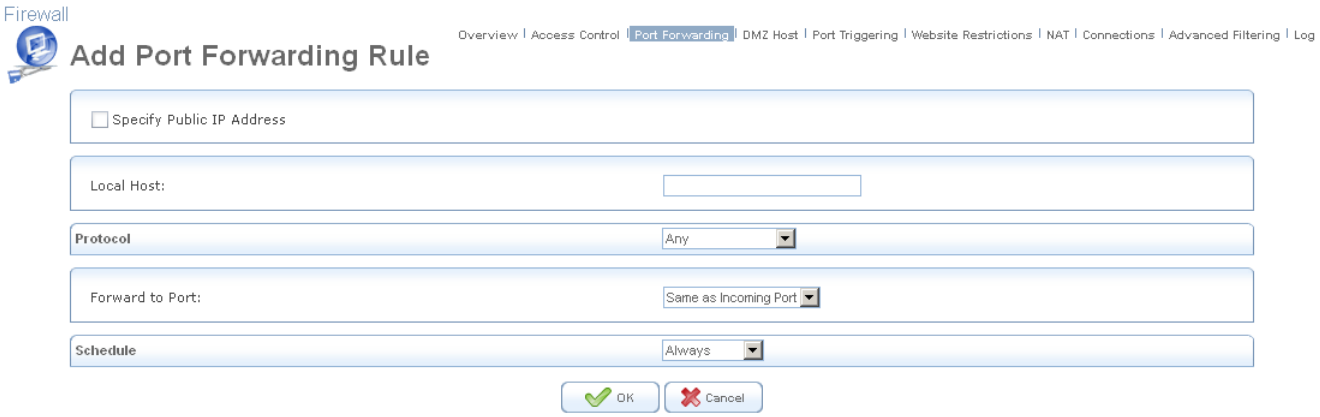


Figure 8-8: Add Port Forwarding Rule

- Select the 'Specify Public IP Address' check box if you would like to apply this rule on Watson's non-default IP address, defined in the 'NAT' screen (refer to Section 8.2.7).

Figure 8-9: Specify Public IP Address

- Enter the additional external IP address in the 'Public IP Address' field.
- Enter the host name or IP address of the computer that will provide the service (the "server") in the 'Local Host' field. Note that unless an additional external IP address has been added, only one LAN computer can be assigned to provide a specific service or application.
- The Protocol drop-down menu menu lets you select or specify the type of protocol that will be used. Selecting the 'Show All Services' option will expand the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This will commence a sequence that will add a new service, representing the protocol. Refer to Section 8.9.1 in order to learn how to do so.
- By default, Watson will forward traffic to the same port as the incoming port. If you wish to redirect traffic to a different port, select the 'Specify' option. The screen will refresh, and an additional field will appear enabling you to enter the port number:

Figure 8-10: Forward to a Specific Port

- The 'Schedule' drop-down menu allows you to define the time period during which this rule will take effect. By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined'. To learn how to configure scheduler rules, refer to Section 9.9.3.

1. Click the 'OK' button to save your changes. The 'Port Forwarding' screen will display a summary of the rule that you just added.

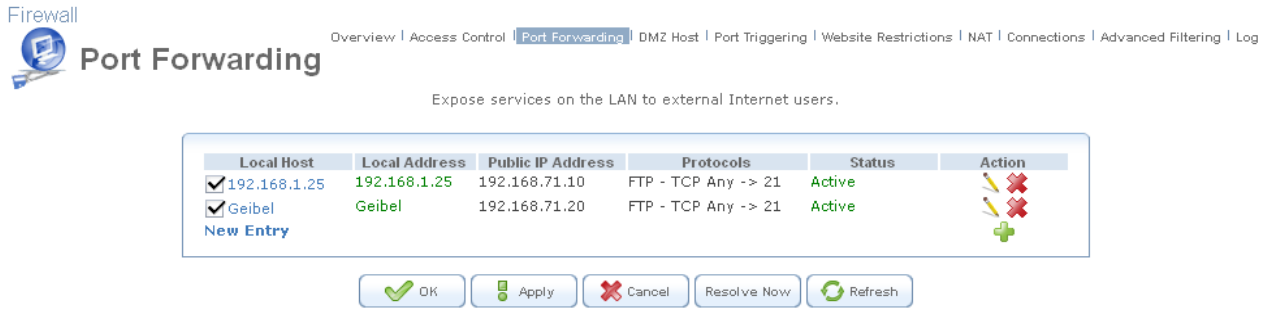


Figure 8-11: Port Forwarding Rule

You may edit the port forwarding rule by clicking its entry under the 'Local Host' column in the 'Port Forwarding' screen. You can disable the rule in order to make a service unavailable without having to remove the rule from the 'Port Forwarding' screen. This may be useful if you wish to make the service unavailable only temporarily and expect that you will want to reinstate it in the future.

- To temporarily disable a rule, clear the check box next to the service name.
- To reinstate it at a later time, simply reselect the check box.
- To remove a rule, click the action icon for the service. The service will be permanently removed.

How many computers can use a service or play a game simultaneously? Well, the answer may be a bit confusing. All the computers on the network can use a specific service, as clients, simultaneously. Being a client means that the computer within the network initiates the connection—for example, opens an FTP connection with an FTP server on the Internet. But only one computer can serve as a server, responding to requests from computers on the Internet.

8.2.3.1 A Port Forwarding Example

In order to allow outside access (from the WAN) to a server inside your LAN, you must configure Watson's firewall, by adding a port forwarding rule. The following exercise demonstrates how to allow such access to an HTTP server located inside Watson's LAN.

When remote administration is enabled on Watson, an attempt to browse to Watson's WBM from a WAN PC will yield the WBM's 'Home' page. However, when the following port forwarding rule is defined on Watson, an attempt to browse to Watson's WBM from a WAN PC will yield the HTTP server located on the LAN.

To enable remote administration, perform the following:

1. From a LAN PC, browse to Watson's WBM and click 'Advanced'. Click the 'Remote Administration' icon, and check the 'Using Primary HTTP Port (80)' check box.

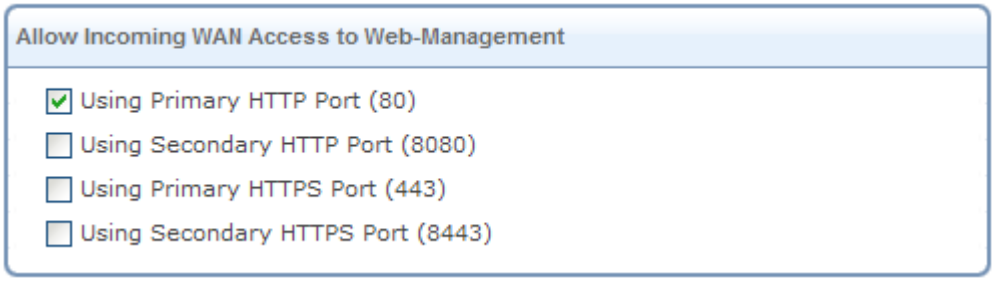

Allow Incoming WAN Access to Web-Management
Using Primary HTTP Port (80)
Using Secondary HTTP Port (8080)
Using Primary HTTPS Port (443)
Using Secondary HTTPS Port (8443)

Figure 8-12: Allow Incoming WAN Access to Web-Management

2. Click 'OK' to save the settings.
3. Verify that remote administration is enabled, by accessing Watson's WBM from a WAN PC.

To define a port forwarding rule, perform the following:

1. From a LAN PC, browse to Watson's WBM and select the 'Firewall' menu item under the 'Services' tab. In the links bar, select 'Port Forwarding', and click 'New Entry'.
2. In the 'Local Host' field, enter the server's LAN PC name or IP address. In the 'Protocol' drop-down menu, select the 'HTTP' protocol.
3. Click 'OK' to save the settings.
4. To verify that port forwarding takes place, access Watson's WBM from a WAN PC. You should be redirected to the LAN HTTP server.

You may disable the port forwarding rule by deselecting its check box in the 'Port Forwarding' screen. If you try to access the local server from the WAN, the HTTP server will not be accessible, and Watson's WBM 'Home' page will appear instead.

8.2.4 DMZ Host

The DMZ (Demilitarized) Host feature allows one local computer to be exposed to the Internet. Designate a DMZ host when:

- You wish to use a special-purpose Internet service, such as an on-line game or video-conferencing program, that is not present in the Port Forwarding list and for which no port range information is available.
- You are not concerned with security and wish to expose one computer to all services without restriction.

Warning: A DMZ host is not protected by the firewall and may be vulnerable to attack. Designating a DMZ host may also put other computers in the home network at risk. When designating a DMZ host, you must consider the security implications and protect it if necessary.

An incoming request for access to a service in the home network, such as a Web-server, is fielded by Watson. Watson will forward this request to the DMZ host (if one is designated) unless the service is being provided by another PC in the home network (assigned in Port Forwarding), in which case that PC will receive the request instead.

To designate a local computer as a DMZ Host:

- Click 'DMZ Host' under the Firewall menu. The 'DMZ Host' screen appears.

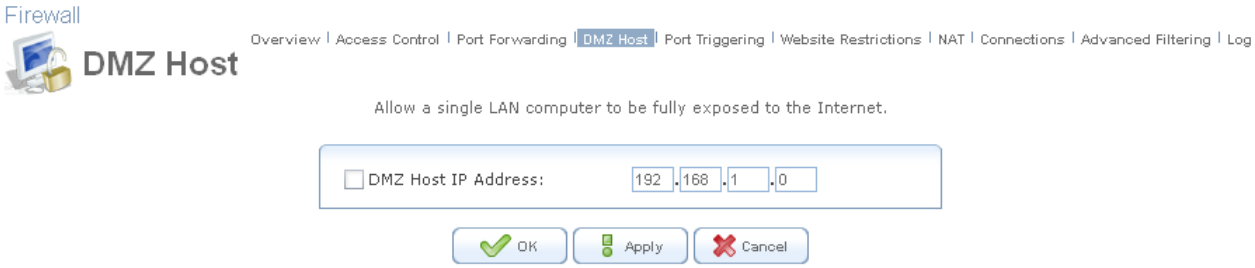

Firewall
DMZ Host
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Allow a single LAN computer to be fully exposed to the Internet.
DMZ Host IP Address:
192 . 168 . 1 . 0
OK
Apply
Cancel

Figure 8-13: DMZ Host

- Enter the local IP address of the computer that you would like to designate as a DMZ host, and select the check-box. Note that only one LAN computer may be a DMZ host at any time.
- Click 'OK' to save the settings.

You can disable the DMZ host so that it will not be fully exposed to the Internet, but keep its IP address recorded on the 'DMZ Host' screen. This may be useful if you wish to disable the DMZ host but expect that you will want to enable it again in the future.

- To disable the DMZ host so that it will not be fully exposed to the Internet, clear the check-box next to the DMZ IP designation, and click 'OK'.
- To reinstate it at a later time, simply reselect the check box.

8.2.5 Port Triggering

Port triggering can be used for dynamic port forwarding configuration. By setting port triggering rules, you can allow inbound traffic to arrive at a specific LAN host, using ports different than those used for the outbound traffic. This is called port triggering since the outbound traffic triggers to which ports inbound traffic is directed.

For example, consider an application server that is accessed using UDP protocol on port 2222. The application server responds by connecting the user using UDP on port 3333 when starting the application sessions. In such a case you must use port triggering, since this scenario conflicts with the following default firewall settings:

- The firewall blocks inbound traffic by default.
- The server replies to Watson's IP, and the connection is not sent back to your host, since it is not part of a session.

In order to solve this you need to define a Port Triggering entry, which allows inbound traffic on UDP port 3333, only after a LAN host generated traffic to UDP port 2222. This will result in accepting the inbound traffic from the application server,

and sending it back to the LAN Host which originated the outgoing traffic to UDP port 2222. Select the 'Port Triggering' tab in the 'Security' management screen. The 'Port Triggering' screen will appear. This screen will list all of the port triggering entries.

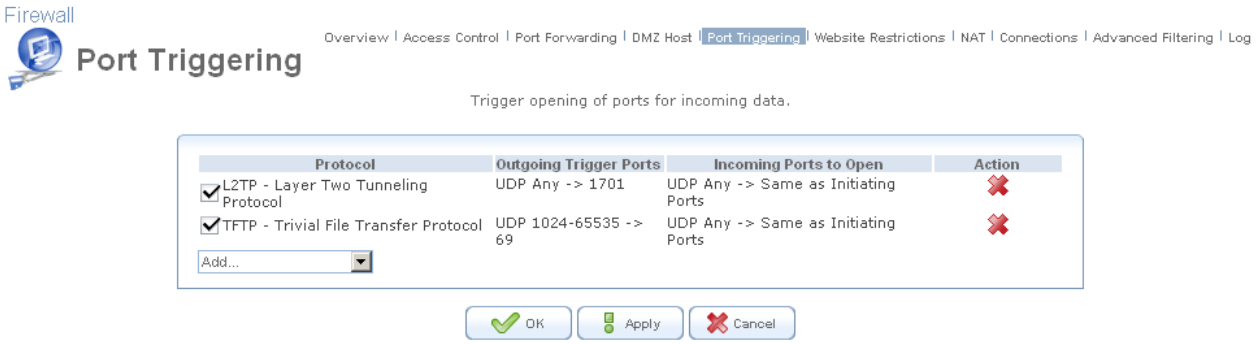

Firewall
Port Triggering
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Trigger opening of ports for incoming data.
Protocol
Outgoing Trigger Ports
Incoming Ports to Open
Action
L2TP - Layer Two Tunneling Protocol
UDP Any -> 1701
UDP Any -> Same as Initiating Ports
TFTP - Trivial File Transfer Protocol
UDP 1024-65535 -> 69
UDP Any -> Same as Initiating Ports
Add...
OK
Apply
Cancel

Figure 8-14: Port Triggering

Let's add an entry for the application server example above:

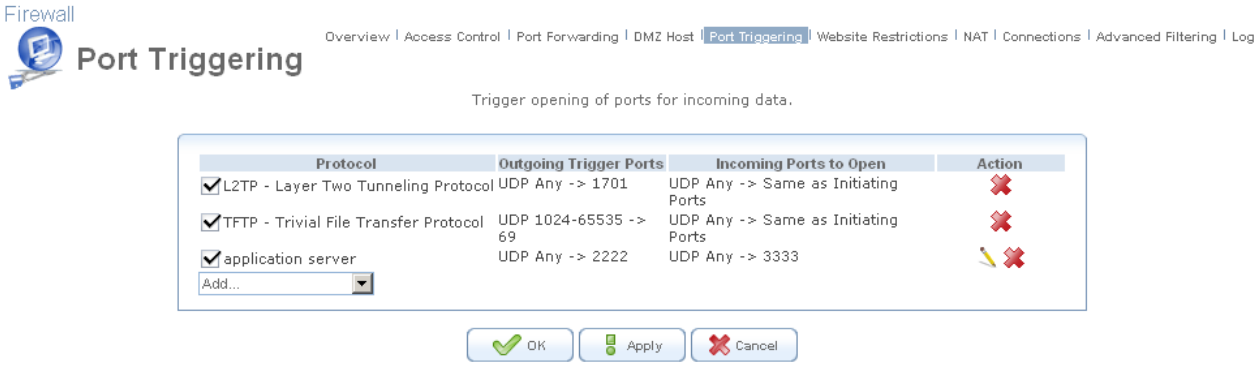

Firewall
Port Triggering
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Trigger opening of ports for incoming data.
Protocol
Outgoing Trigger Ports
Incoming Ports to Open
Action
L2TP - Layer Two Tunneling Protocol
UDP Any -> 1701
UDP Any -> Same as Initiating Ports
TFTP - Trivial File Transfer Protocol
UDP 1024-65535 -> 69
UDP Any -> Same as Initiating Ports
application server
UDP Any -> 2222
UDP Any -> 3333
Add...
OK
Apply
Cancel

Figure 8-15: New Port Triggering Rule

1. Select the 'User Defined' option to add an entry. The 'Edit Port Triggering Rule' screen will appear.

Enter a name for the service (e.g. "application_server"), and click the 'New Trigger Ports' link. The 'Edit Service Server Ports' screen will appear.

In the Protocol combo-box, select UDP. The screen will refresh, providing source and destination port options.

2. Leave the Source Ports combo-box at its default "Any". In the Destination Ports combo-box, select "Single". The screen will refresh again, providing an additional field in which you should enter "2222" as the destination port.

3. Click 'OK' to save the settings.

Back in the 'Edit Port Triggering Rule' screen, click the 'New Opened Ports' link. The 'Edit Service Opened Ports' screen will appear.

Similar to the trigger ports screen, select UDP as the protocol, leave the source port at "Any", and enter a 3333 as the single destination port.

4. Click 'OK' to save the settings.

You can disable a port triggering rule without having to remove it from the 'Port Triggering' screen.

- To temporarily disable a rule, clear the check box next to the service name.
- To reinstate it at a later time, simply reselect the check box.
- To remove a rule, click the action icon for the service. The service will be permanently removed.

There may be a few default port triggering rules listed when you first access the port triggering screen. Please note that disabling these rules may result in impaired gateway functionality.

8.2.6 Website Restrictions

You may configure Watson to block specific Internet websites so that they cannot be accessed from computers in the home network. Moreover, restrictions can be applied to a comprehensive and automatically-updated table of sites to which access is not recommended.

To block access to a website:

1. Click the 'Website Restrictions' tab in the 'Security' management screen.

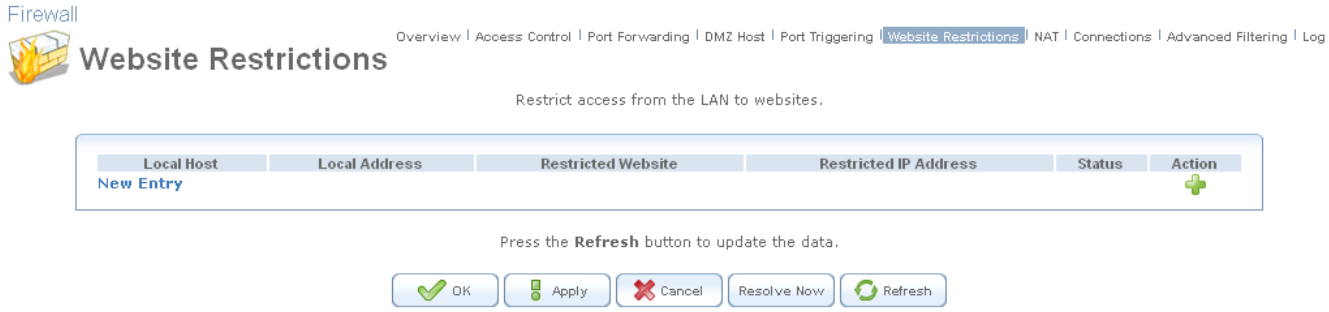


Figure 8-16: Website Restrictions

2. Click the 'New Entry' link. The 'Restricted Website' screen appears.
3. Enter the URL (or part of the URL) that you would like to make inaccessible from your home network (all Web pages within this URL will also be blocked). If the URL has multiple IP addresses, Watson will resolve all additional addresses and automatically add them to the restrictions table.
4. The Local Host drop-down menu provides you the ability to specify the computer or group of computers for which you would like to apply the website restriction. You can select between any, a specific computer in your LAN, or 'User Defined'. If you choose the 'User Defined' option, the 'Edit Network Object' screen appears. Specifying an address is done by creating a 'Network Object'; to learn more about network objects, refer to Section 9.9.2.
5. The 'Schedule' drop-down menu allows you to define the time period during which this rule will take effect. By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined'. To learn how to configure scheduler rules, refer to Section 9.9.3.
6. Click 'OK' to save the settings.

7. Click the 'Refresh' button to update the status if necessary. If the site is successfully located then 'Resolved' will appear in the status bar, otherwise 'Hostname Resolution Failed' will appear. In case Watson fails to locate the website, do the following:

   - Use a Web browser to verify that the website is available. If it is, then you probably entered the website address incorrectly.
   - If the website is not available, return to the 'Website Restrictions' screen at a later time and click the 'Resolve Now' button to verify that the website can be found and blocked by Watson.

You may edit the website restriction by modifying its entry under the 'Local Host' column in the 'Website Restrictions' screen.

To modify an entry:

1. Click the action icon for the restriction. The 'Restricted Website' screen appears. Modify the website address, group or schedule as necessary.
2. Click the 'OK' button to save your changes and return to the 'Website Restrictions' screen.

To ensure that all current IP addresses corresponding to the restricted websites are blocked:

- Click the 'Resolve Now' button. Watson will check each of the restricted website addresses and ensure that all IP addresses at which this website can be found are included in the IP addresses column.

You can disable a restriction in order to make a website available again without having to remove it from the 'Website Restrictions' screen. This may be useful if you wish to make the website available only temporarily and expect that you will want to block it again in the future.

- To temporarily disable a rule, clear the check box next to the service name.
- To reinstate it at a later time, simply reselect the check box.
- To remove a rule, click the action icon for the service. The service will be permanently removed.

8.2.7 Network Address Translation (NAT)

Watson features a configurable Network Address Translation (NAT) and Network Address Port Translation (NAPT) mechanism, allowing you to control the network addresses and ports of packets routed through your gateway. When enabling multiple computers on your network to access the Internet using a fixed number of public IP addresses, you can statically define which LAN IP address will be translated to which NAT IP address and/or ports.

By default, Watson operates in NAPT routing mode (refer to Section 8.4.8.3). However, you can control your network translation by defining static NAT/NAPT rules. Such rules map LAN computers to NAT IP addresses. The NAT/NAPT mechanism is useful for managing Internet usage in your LAN, or complying with various application demands. For example, you can assign your primary LAN computer with a single NAT IP address, in order to assure its permanent connection to the Internet. Another example is when an application server with which you wish to connect,

such as a security server, requires that packets have a specific IP address – you can define a NAT rule for that address.

8.2.7.1 Configuration

Click the 'NAT' tab in the 'Security' management screen. The 'NAT' screen will appear .

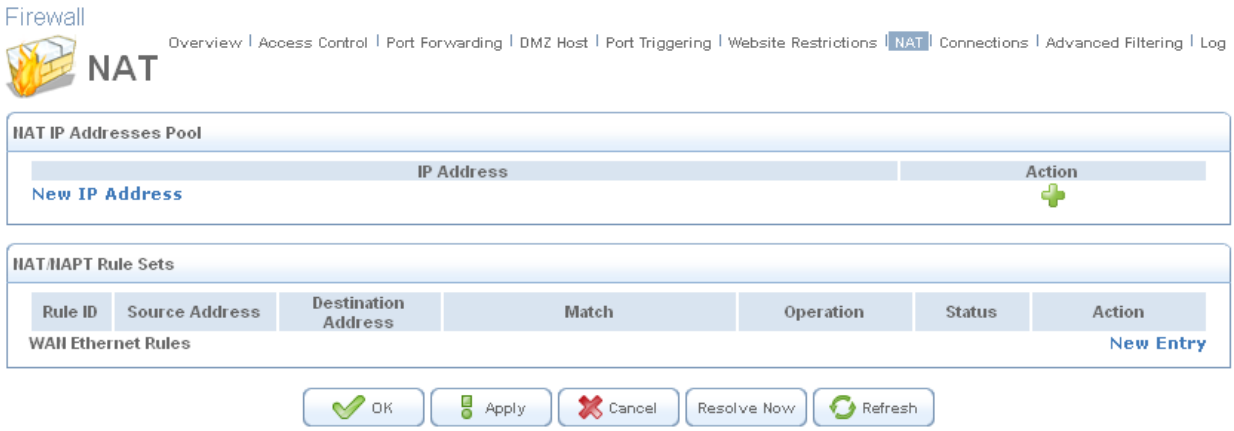


Figure 8-17: Network Address Translation

Before configuring NAT/NAPT rules, you must first enter the additional public IP addresses obtained from your ISP as your NAT IP addresses, in the 'NAT IP Addresses Pool' section. The primary IP address used by the WAN device for dynamic NAPT should not be added to this table. To add a NAT IP address, click the 'New IP Address' link. The 'Edit Item' screen will appear.

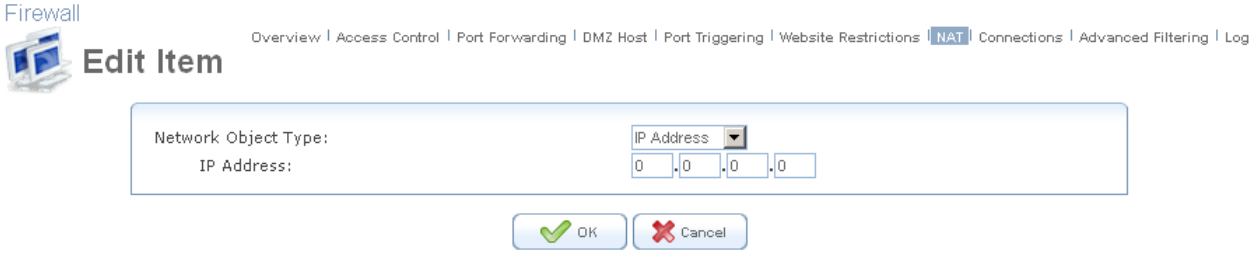

Firewall
Edit Item
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Network Object Type:
IP Address
IP Address:
0 . 0 . 0 . 0
OK
Cancel

Figure 8-18: Edit Item

Select between IP address, subnet or range in the 'Network Object Type' combo box, and enter the information respectively. To add a new NAT/NAPT rule, click the 'New Entry' link in the 'NAT/NAPT Rule Sets' section. The 'Add NAT/NAPT Rule' screen will appear.

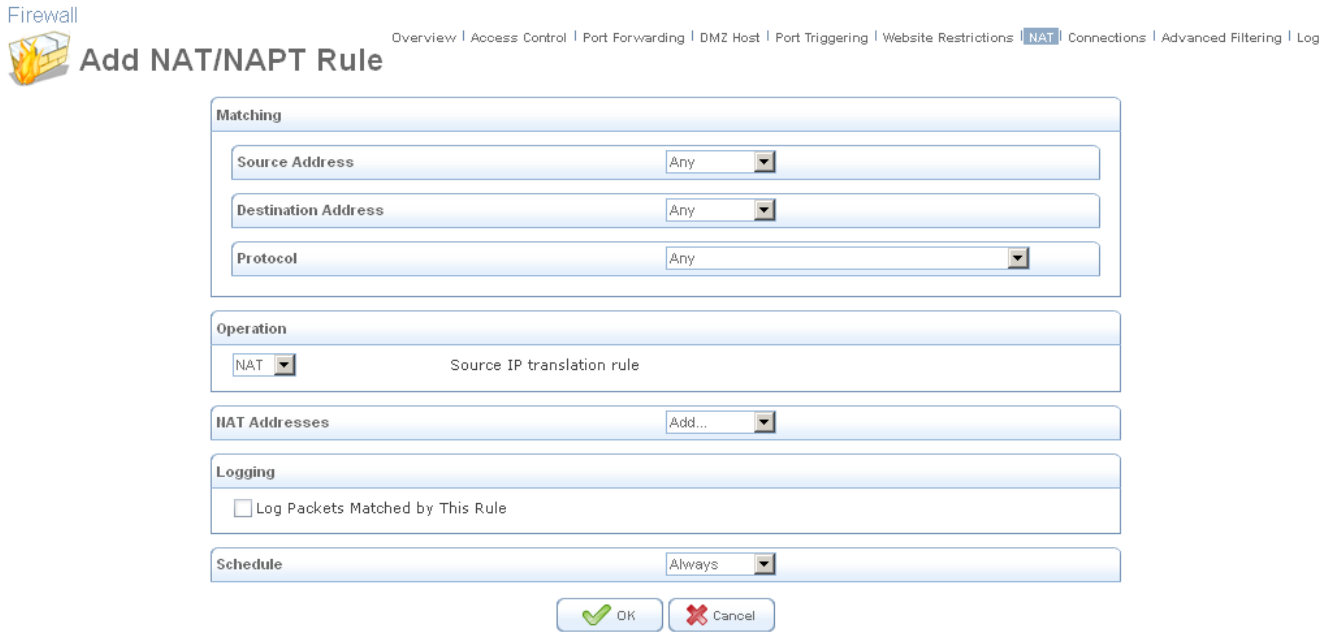


Figure 8-19: Add NAT/NAPT Rule

This screen is divided into two main sections, 'Matching' and 'Operation'. The 'Matching' section defines the LAN addresses to be translated to the external addresses, which are defined in the 'Operation' section.

Matching Use this section to define characteristics of the packets matching the rule.

- **Source Address** The source address of packets sent or received by Watson. The drop-down menu displays the names or IP addresses of the hosts currently connected to Watson's LAN, as well as the options 'Any' and 'User Defined'. Select an address or name from the list to apply the rule on the corresponding host, or 'Any' to apply the rule on all Watson's LAN hosts. If you would like to add a new address, select the 'User Defined' option in the drop-down menu. This will commence a sequence that will add a new network object, representing the new host. Refer to Section 9.9.2 in order to learn how to do so.
- **Destination Address** The destination address of packets sent or received by Watson. This address can be configured in the same manner as the source address. This entry enables further filtration of the packets.
- **Protocol** You may also specify a traffic protocol. Selecting the 'Show All Services' option from the drop-down menu will expand the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This will commence a sequence that will add a new service, representing the protocol. Refer to Section 8.9.1 in order to learn how to do so.

Operation Use this section to define the operation that will be applied on the IP addresses matching the criteria defined above. The operations available are NAT or NAPT. Selecting each from the combo box will refresh the screen accordingly.

NAT Addresses The NAT address into which the original IP address will be translated. The combo box displays all of your available NAT addresses/ranges, from which you can select an entry. If you would like to add a single address or a subrange from the given pool/range, select the 'User Defined' option in the combo box. Similarly, this will commence a sequence that will add a new network object.

NAPT Address The NAPT address into which the original IP address will be translated. The combo box displays all of your available NAPT addresses/ranges, from which you can select an entry. If you would like to add a single address or a subrange from the given pool/range, select the 'User Defined' option in the combo box. Similarly, this will commence a sequence that will add a new network object. Note, however, that in this case the network object may only be an IP address, as NAPT is port-specific.

NAPT Ports Specify the port(s) of the IP address into which the original IP address will be translated. Enter a single port or select 'Range' in the combo box. The screen will refresh, enabling you to enter a range of ports.

Logging Monitor the rule.

- **Log Packets Matched by This Rule** Select this check box to log the first packet from a connection that was matched by this rule.

Schedule By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined', in order to define time segments during which the rule may be active. To learn how to configure scheduler rules, refer to Section 9.9.3.

Using a protocol requires observing the relationship between a client and a server, in order to distinguish between the source and destination ports. For example, let's assume you have an FTP server in your LAN, serving clients inquiring from the WAN. You want to apply a NAPT rule on incoming packets from any port on the WAN (clients) trying to access FTP port 21 (your server), and the same for outgoing packets from port 21 trying to access any port on the WAN. Therefore, you must set the following QoS rules:

- In the 'Matching' section of 'NAT/NAPT Rules', set the 'Protocol' drop-down menu to: TCP Any -> 21 (available as a predefined service, named FTP).
- In the 'Operation' section of 'NAT/NAPT Rules', select ‘NAPT’.

8.2.7.2 Using NAT/NAPT

This section demonstrates the NAT/NAPT usage and capabilities, by creating several rules and observing their implementation.

8.2.7.3 Adding NAT/NAPT IP Addresses

In the following examples, LAN IP addresses are marked 192.168.1.X, while NAT addresses are marked 192.168.71.X. Assuming your obtained public IP addresses are 192.168.71.12 through 192.168.71.20, add them as NAT IP addresses to the WAN Ethernet settings, as follows:

Figure 8-20: NAT IP Addresses

1. Click the 'NAT' tab in the 'Security' management screen. The 'NAT' screen will appear.
2. Click the 'New IP Address' link in the 'NAT IP Addresses Pool' section. The 'Edit Item' screen will appear.
3. Select the IP address option and enter 192.168.71.12.
4. Click 'OK' to save the settings.
5. Click the 'New IP Address' link again to enter the rest of the addresses. This sequence is for demonstration purposes; you may enter your public IP addresses in the method that suits you.
6. Select the IP range option and enter 192.168.71.13 through 192.168.71.20.
7. Click 'OK' to save the settings.

8.2.7.4 Defining NAT/NAPT Rules

You can now add NAT/NAPT rules based on these IP addresses. Click the 'New Entry' link in the 'NAT/NAPT Rule Sets' section. The 'Add NAT/NAPT Rule' screen will appear (see Figure 8-19).

Create the following NAT/NAPT rules:

STEP 1 Translate the address 192.168.1.10 to 192.168.71.12. In this example we assume that LAN addresses (192.168.1.X) are not yet connected, therefore do not appear as combo box options, and network objects must be created in order to represent them.

Select 'User Defined' in the 'Source Address' combo box. The 'Edit Network Object' screen will appear.

Click 'New Entry'. The 'Edit Item' screen will appear.

1. Select 'IP Address' in the 'Network Object Type' combo box, and enter 192.168.1.10.
2. Click 'OK' to save the settings.
3. Click 'OK' once more in the 'Edit Network Object' screen.

4. Back in the 'Add NAT/NAPT Rule' screen, select the '192.168.71.12' option in the 'NAT Addresses' combo box. The screen will refresh, adding this address as a NAT IP address.

5. Click 'OK' to save the settings.

This NAT rule will be displayed in the 'NAT' screen:

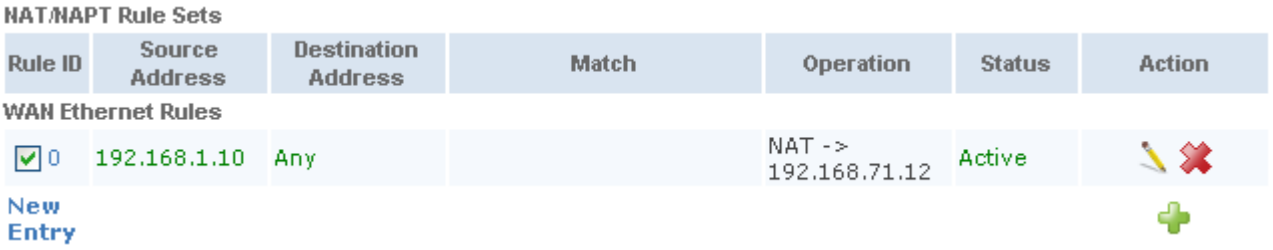


Figure 8-21: NAT/NAPT Rule Sets

This rule translates one LAN IP address to one NAT IP address, meaning that this LAN computer will have WAN access at any time. The status is therefore set to "Active".

STEP 2 Translate the range 192.168.1.11–192.168.1.15 to 192.168.71.12–192.168.71.15. Define this NAT rule in the same manner depicted above, with the exception of selecting 'IP Range' (instead of 'IP Address') as the network object type. Since both ranges are not predefined (no such combo box options), network objects must be created in order to represent them, using the 'User Defined' option. The rule will be displayed in the 'NAT' screen:

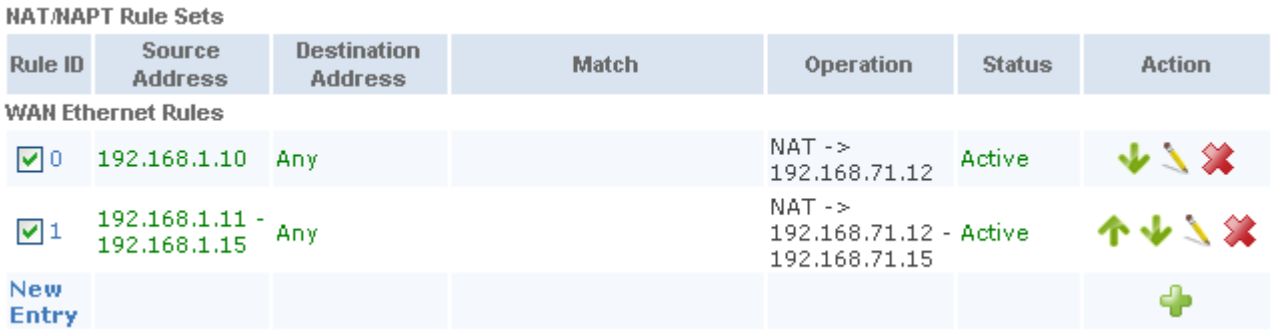


Figure 8-22: NAT/NAPT Rule Sets

This rule translates five new LAN IP addresses to four NAT IP addresses, which would normally mean that only four of the five LAN computers may have WAN access at the same time. However, note that the NAT address 192.168.71.12 is already in use by the first rule. Watson will therefore allow these five LAN computers to use only the three remaining IP addresses: 71.13, 71.14 and 71.15. The status is therefore set to "Active".

STEP 3 Translate the range 192.168.1.21–192.168.1.25 to 192.168.71.13–192.168.71.14. Define this NAT rule in the same manner depicted above. The following attention message will be displayed:

Figure 8-23: Attention

Click 'OK'. The rule will be displayed in the 'NAT' screen:

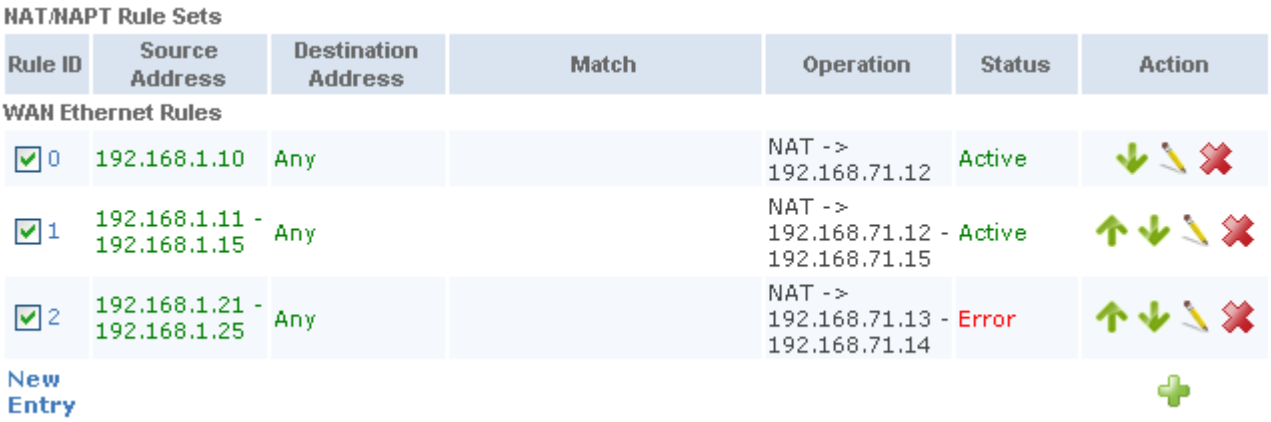


Figure 8-24: NAT/NAPT Rule Sets

This rule translates five new LAN IP addresses to two NAT IP addresses, both of which are already in use by the second rule. Watson is therefore unable to resolve this situation and the rule's status is set to "Error". Notice that this rule been defined as the second rule, all three rules would be valid. This is because the NAT address 192.168.71.15 would still be available for rule number 1. This can easily be amended: you can use the green arrow icons to move a rule entry up or down, changing its priority respectively. Click this rule's action icon once. All rules will now be set to "Active".

Rule number 1 now maps five LAN addresses to one NAT address. Watson subtracts all previously used NAT addresses, requested by previous rules, from the requested NAT addresses of the current rule. The requested range of addresses does not determine how many will be available; the number of available addresses is determined by previous rules configuration and order. Rules will appear as "Active" even if they only have one usable NAT address.

STEP 4 Translate the address 192.168.1.5 to 192.168.71.16 ports 1024-1050. Define this NAPT rule in the same manner depicted above, with the following exception:

1. Select the 'NAPT' option in the 'Operation' section combo box. The screen will refresh:

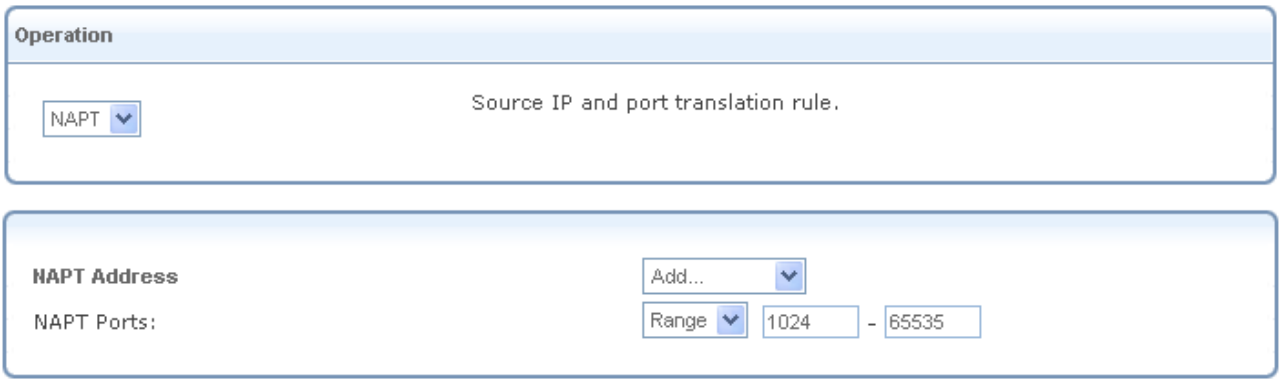


Figure 8-25: Add NAPT Rule

2. Add a NAPT address by selecting the 'User Defined' option.
3. Enter 1024-1050 as the range of ports in the 'NAPT Ports' section.
4. Click 'OK' to save the settings.

The rule will be displayed in the 'NAT' screen:

NAT/NAPT Rule Sets

Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
2	192.168.1.21 - 192.168.1.25	Any		NAT -> 192.168.71.13 - 192.168.71.14	Active	
1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
3	192.168.1.5	Any		NAPT -> 192.168.71.16 ports 1024-1050	Active	
New Entry						

Figure 8-26: NAT/NAPT Rule Sets

This rule translates a LAN IP address to a NAT IP address with specific ports. Its status is set to "Active".

STEP 5 Translate the address 192.168.1.6 to 192.168.71.16 ports 1024-1100. Define this NAPT rule in the same manner depicted above. The rule will be displayed in the 'NAT' screen:

NAT/NAPT Rule Sets

Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
2	192.168.1.21 - 192.168.1.25	Any		NAT -> 192.168.71.13 - 192.168.71.14	Active	
1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
3	192.168.1.5	Any		NAPT -> 192.168.71.16 ports 1024-1050	Active	
4	192.168.1.6	Any		NAPT -> 192.168.71.16 ports 1024-1100	Active	

New Entry

Figure 8-27: NAT/NAPT Rule Sets

This rule translates a LAN IP address to a NAT IP address with ports 1024-1100. However, only ports 1051-1100 will be used for this LAN computer, as ports 1024-1050 are already in use by the preceding rule. The status is set to "Active".

Every new NAT/NAPT rule is verified in relation to preceding rules. Rules are prioritized according to the order in which they are defined. As long as at least one unused IP address (or port) is available, the rule will be accepted. However, as seen in the examples above, not all addresses in the range defined may be available for computers in that rule; some may already be in use by other rules. Watson automatically calculates the relationships between rules, narrowing down the address ranges if needed, and thus provides placability for user input. The verification performed by Watson is as follows:

NAT rule:

- Verifies whether the IP address is already in use by another NAT/NAPT rule.

NAPT rule:

- Verifies whether the port is already in use by another NAPT rule activated on the same IP address.
- Verifies whether the IP address is already in use by another NAT rule.

8.2.8 Connections

The connection list displays all the connections that are currently open, as well as various details and statistics. You can use this list to close an undesired connection by clicking its action icon . The basic display includes the name of the protocol, the different ports it uses, and the direction in which the connection was initiated.

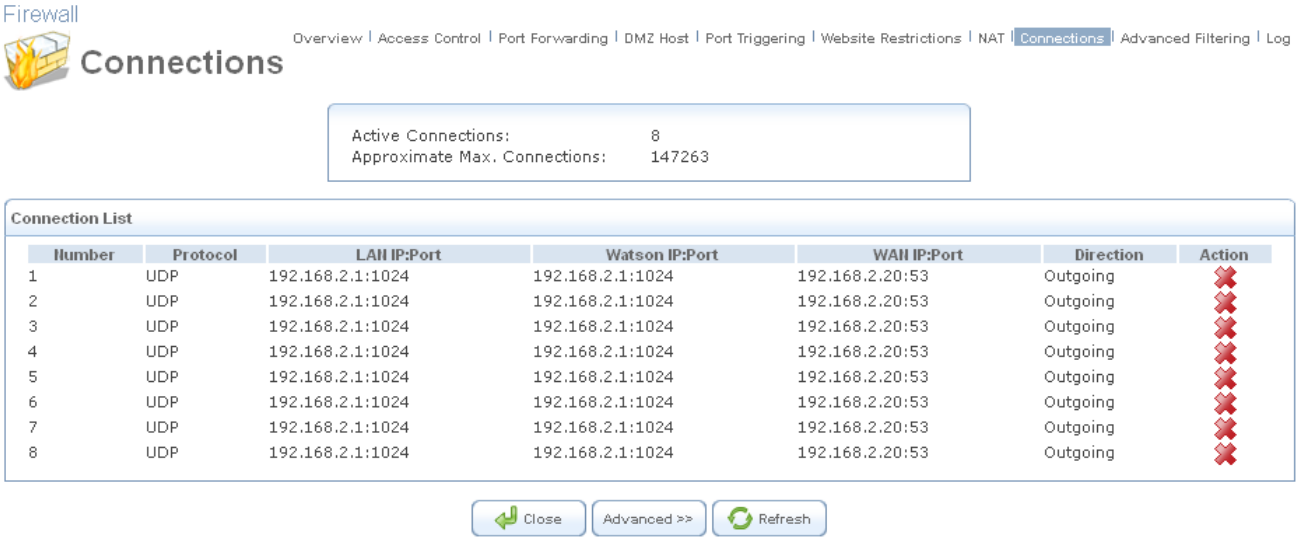

Firewall
Connections
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Active Connections: 8
Approximate Max. Connections: 147263
Connection List
Number Protocol LAN IP:Port Watson IP:Port WAN IP:Port Direction Action
1 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
2 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
3 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
4 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
5 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
6 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
7 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
8 UDP 192.168.2.1:1024 192.168.2.1:1024 192.168.2.20:53 Outgoing
Close
Advanced >>
Refresh

Figure 8-28: Connection List

Click 'Advanced' to display the following details:

- The connection's time-to-live
- The number of kilo-bytes and packets received and transmitted
- The device type
- The routing mode

The 'Approximate Max. Connections' value represents the amount of additional concurrent connections possible.

8.2.9 Advanced Filtering

Advanced filtering is designed to allow comprehensive control over the firewall's behavior. You can define specific input and output rules, control the order of logically similar sets of rules and make a distinction between rules that apply to WAN and LAN devices.

To view Watson's advanced filtering options, click 'Advanced Filtering' under the 'Firewall' tab in the 'Services' screen. The 'Advanced Filtering' screen appears:

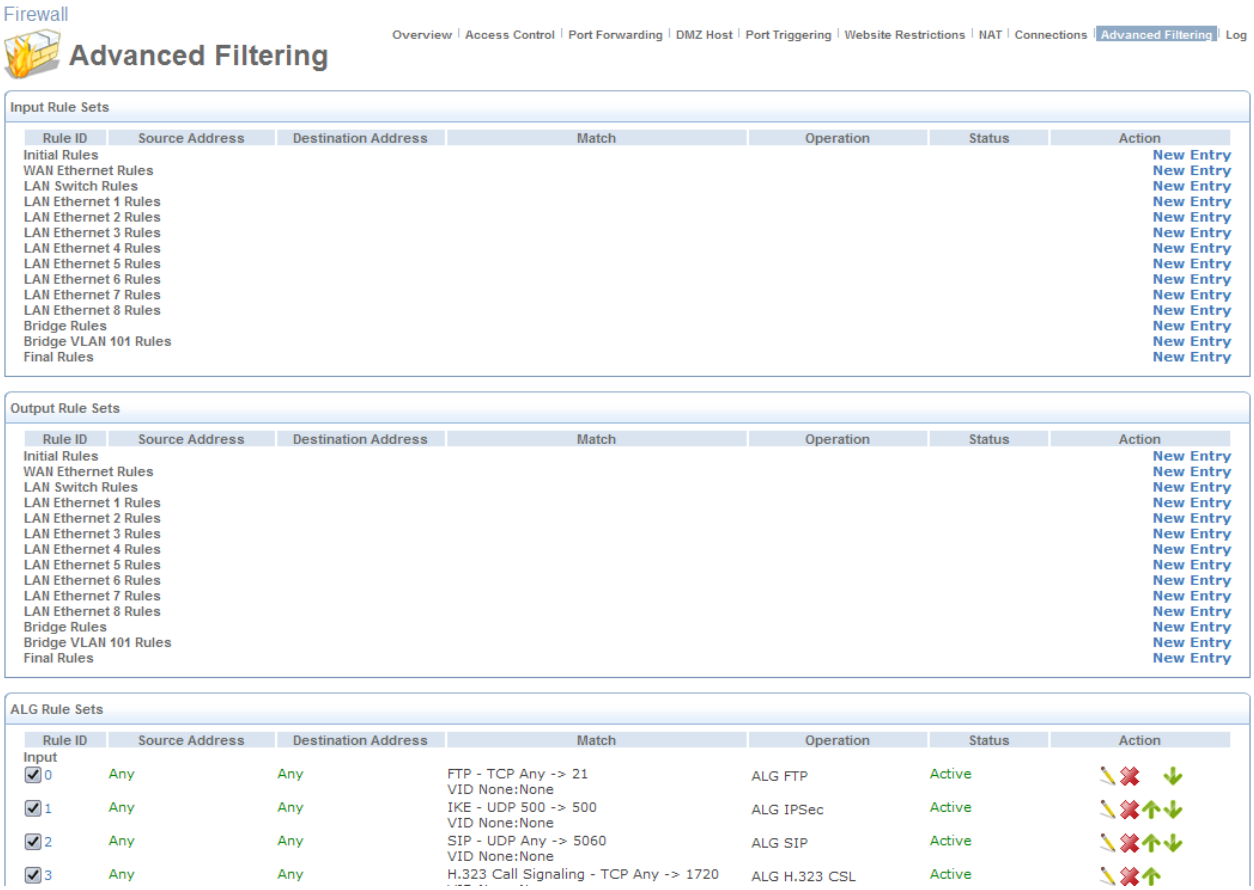

Firewall
Advanced Filtering
Overview | Access Control | Port Forwarding | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering | Log
Input Rule Sets
Rule ID | Source Address | Destination Address | Match | Operation | Status | Action
Initial Rules
WAN Ethernet Rules
LAN Switch Rules
LAN Ethernet 1 Rules
LAN Ethernet 2 Rules
LAN Ethernet 3 Rules
LAN Ethernet 4 Rules
LAN Ethernet 5 Rules
LAN Ethernet 6 Rules
LAN Ethernet 7 Rules
LAN Ethernet 8 Rules
Bridge Rules
Bridge VLAN 101 Rules
Final Rules
New Entry
Output Rule Sets
Rule ID | Source Address | Destination Address | Match | Operation | Status | Action
Initial Rules
WAN Ethernet Rules
LAN Switch Rules
LAN Ethernet 1 Rules
LAN Ethernet 2 Rules
LAN Ethernet 3 Rules
LAN Ethernet 4 Rules
LAN Ethernet 5 Rules
LAN Ethernet 6 Rules
LAN Ethernet 7 Rules
LAN Ethernet 8 Rules
Bridge Rules
Bridge VLAN 101 Rules
Final Rules
New Entry
ALG Rule Sets
Rule ID | Source Address | Destination Address | Match | Operation | Status | Action
Input
0 Any Any FTP - TCP Any -> 21 VID None:None ALG FTP Active
1 Any Any IKE - UDP 500 -> 500 VID None:None ALG IPSec Active
2 Any Any SIP - UDP Any -> 5060 VID None:None ALG SIP Active
3 Any Any H.323 Call Signaling - TCP Any -> 1720 ALG H.323 CSL Active

Figure 8-29: Advanced Filtering

8.2.9.1 Adding Input and Output Rules

The first two sections of the 'Advanced Filtering' screen—'Input Rule Sets' and 'Output Rule Sets', are designed for configuring inbound and outbound traffic respectively. Each section is comprised of subsets, which can be grouped into three main subjects:

- **Initial rules** - rules defined here will be applied first, on all gateway devices.
- **Network devices rules** - rules can be defined per each gateway device.
- **Final rules** - rules defined here will be applied last, on all gateway devices.

The order of the rules' appearance represents both the order in which they were defined and the sequence by which they will be applied. You may change this order after your rules are already defined (without having to delete and then re-add them), by using the action icon and action icon .

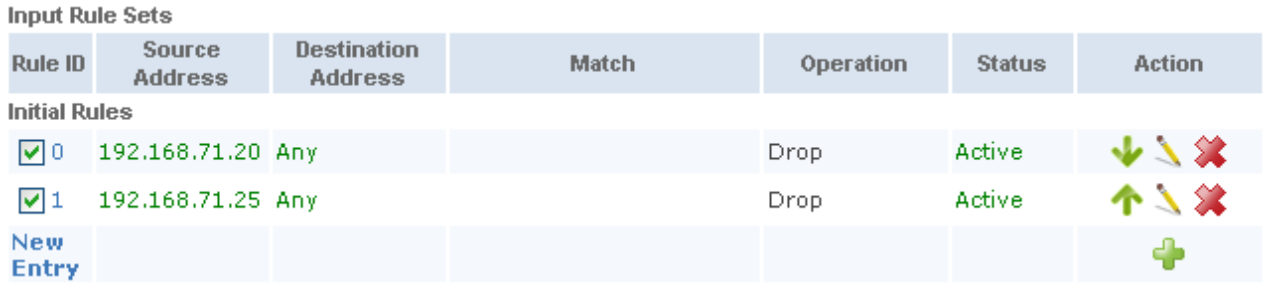


Figure 8-30: Move Up and Move Down Action Icons

There are numerous rules automatically inserted by the firewall in order to provide improved security and block harmful attacks. To add an advanced filtering rule, first choose the traffic direction and the device on which to set the rule. Then click the appropriate 'New Entry' link. The 'Add Advanced Filter' screen appears:

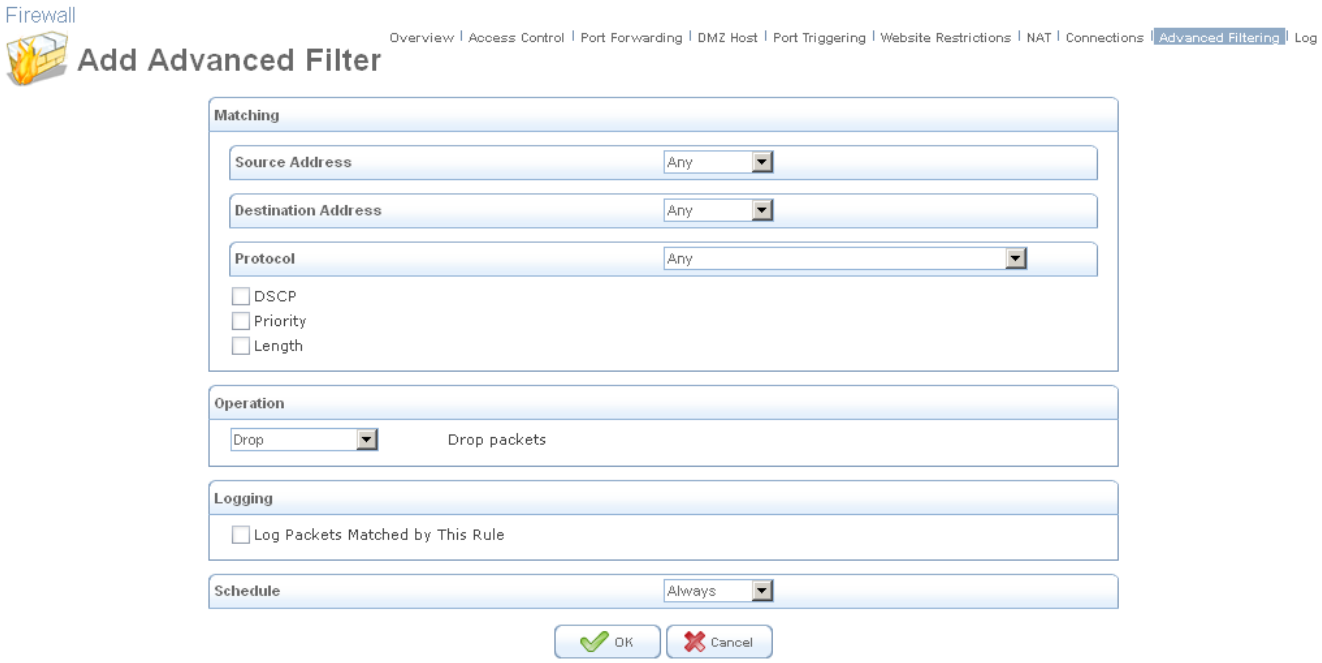


Figure 8-31: Add Advanced Filter

The 'Matching' and 'Operation' sections of this screen define the operation to be executed when matching conditions apply.

Matching Use this section to define characteristics of the packets matching the rule.

- **Source Address** The source address of packets sent or received by Watson. The drop-down menu displays the names or IP addresses of the hosts currently connected to Watson's LAN, as well as the options 'Any' and 'User Defined'. Select an address or name from the list to apply the rule on the corresponding host, or 'Any' to apply the rule on all Watson's LAN hosts. If you would like to add a new address, select the 'User Defined' option in the drop-down menu. This will commence a sequence that will add a new network object, representing the new host. Refer to Section 9.9.2 in order to learn how to do so.

- **Destination** Address The destination address of packets sent or received by Watson. This address can be configured in the same manner as the source address. This entry enables further filtration of the packets.
- **Protocol** You may also specify a traffic protocol. Selecting the 'Show All Services' option from the drop-down menu will expand the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This will commence a sequence that will add a new service, representing the protocol. Refer to Section 9.9.1 in order to learn how to do so.
- **DSCP** Select this check box to display two DSCP fields, which enable you to specify a hexadecimal DSCP value and its mask assigned to the packets matching the priority rule.
- **Priority** Select this check box to display a drop-down menu, in which you can select a priority level assigned to the packets matching the priority rule.
- **Length** Select this check box if you would like to specify the length of packets, or the length of their data portion.

Operation Define what action the rule will take, by selecting one of the following radio buttons:

Drop Deny access to packets that match the source and destination IP addresses and service ports defined above.

Reject Deny access to packets that match the criteria defined, and send an ICMP error or a TCP reset to the origination peer.

Accept Connection Allow access to packets that match the criteria defined. The data transfer session will be handled using Stateful Packet Inspection (SPI), meaning that other packets matching this rule will be automatically allowed access.

Accept Packet Allow access to packets that match the criteria defined. The data transfer session will not be handled using SPI, meaning that other packets matching this rule will not be automatically allowed access. This can be useful, for example, when creating rules that allow broadcasting.

Logging Monitor the rule.

- **Log Packets Matched by This Rule** Select this check box to log the first packet from a connection that was matched by this rule.

Schedule By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined', in order to define time segments during which the rule may be active. To learn how to configure scheduler rules, refer to Section 9.9.3.

8.2.9.2 Adding ALG Rules

The 'ALG Rule Sets' section enables you to define address and port processing rules for certain application protocols (such as, FTP, TFTP, SIP, and others), which carry the IP address inside the application data. Most of these protocols will not work with the NAT, unless the NAT is aware of them and does the appropriate translation.

The NAT is application independent, therefore a specific Application Level Gateway (ALG) is required to perform payload monitoring and needed alterations to allow the application's traffic to pass through the firewall. The 'Input' and 'Output' subsections of the 'ALG Rule Sets' feature are designated to display ALG rules for inbound and

outbound traffic respectively. Note that Watson is automatically configured with ALG rules for several widespread protocols. You can edit a rule by clicking its respective action icon, or remove it by clicking the action icon .

To create an ALG rule, either inbound or outbound, click the 'New Entry' link that corresponds to the rule type you would like to define. The 'Add ALG Rule' screen appears.

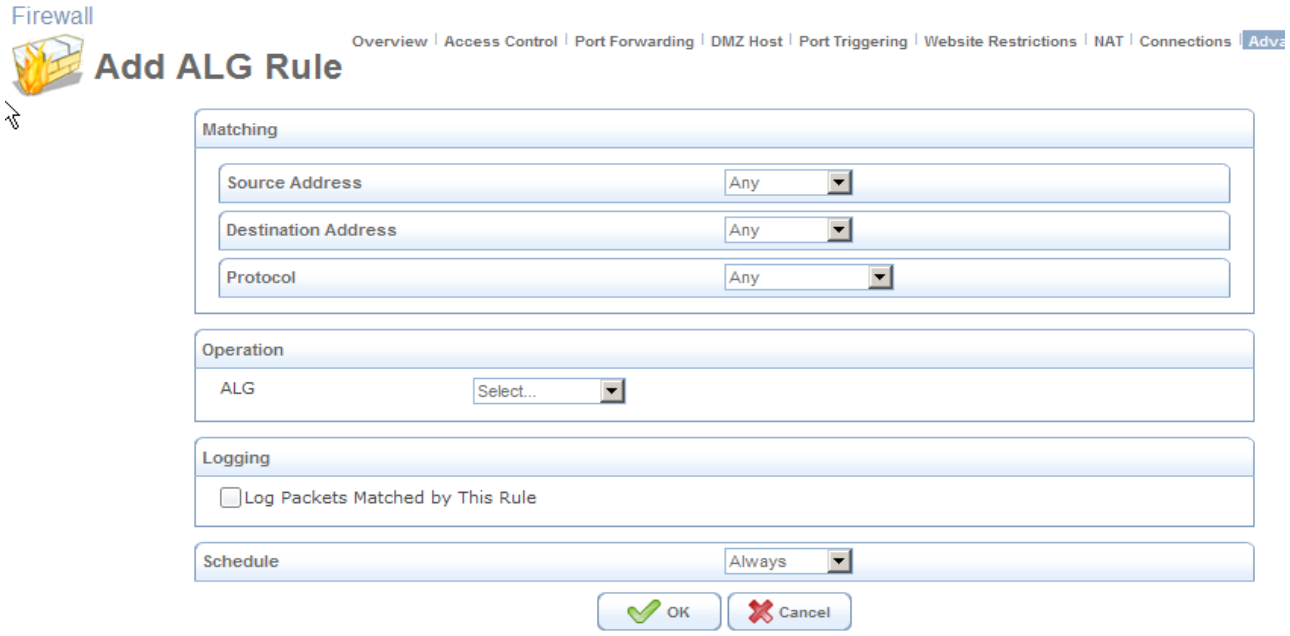


Figure 8-32: Add ALG Rule

The 'Matching' and 'Operation' sections of this screen define the operation to be executed when matching conditions apply.

Matching Use this section to define characteristics of the packets matching the rule.

- **Source Address** The source address of packets sent or received by Watson. Use this drop-down menu to specify the computer or group of computers on which you would like to apply the rule. Select an address or a name from the list to apply the rule on the corresponding host, or 'Any' to apply the rule on any host trying to send data. If you would like to add a new address, select the 'User Defined' option in the drop-down menu. This will commence a sequence that will add a new Network Object, representing the new host. Refer to Section 9.9.2 in order to learn how to do so.
- **Destination Address** The destination address of packets sent or received by Watson. This address can be configured in the same manner as the source address. For example, use this drop-down menu to specify an IP address of a remote application server (such as a security server), which requires that the incoming packets have a specific IP address (e.g., one of those defined in your NAT IP address pool).
- **Protocol** You may also specify a traffic protocol. Selecting the 'Show All Services' option from the drop-down menu expands the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This

will commence a sequence that will add a new Service, representing the protocol. Refer to Section 9.9.2 in order to learn how to do so.

Operation Define which ALG will be used, by selecting one from the designated drop-down menu.

Logging Monitor the rule.

- Log Packets Matched by This Rule Select this check box to log the first packet from a connection that was matched by this rule.

Schedule By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined', in order to define time segments during which the rule may be active. After more than one scheduler rule is defined, the 'Schedule' drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3

Note: The defined ALG rule will also be applied to the child processes of the application that utilizes the selected protocol.

The order of the rules' appearance represents both the order in which they were defined and the sequence by which they will be applied. You may change this order after your rules are already defined (without having to delete and then re-add them), by using the action icon and action icon .

8.2.10 Log

The 'Security Log' screen displays a list of firewall-related events, including attempts to establish inbound and outbound connections, attempts to authenticate through an administrative interface (WBM or Telnet terminal), firewall configuration and system start-up. To view the firewall log, click the 'Log' tab in the 'Firewall' management screen. The 'Log' screen appears.

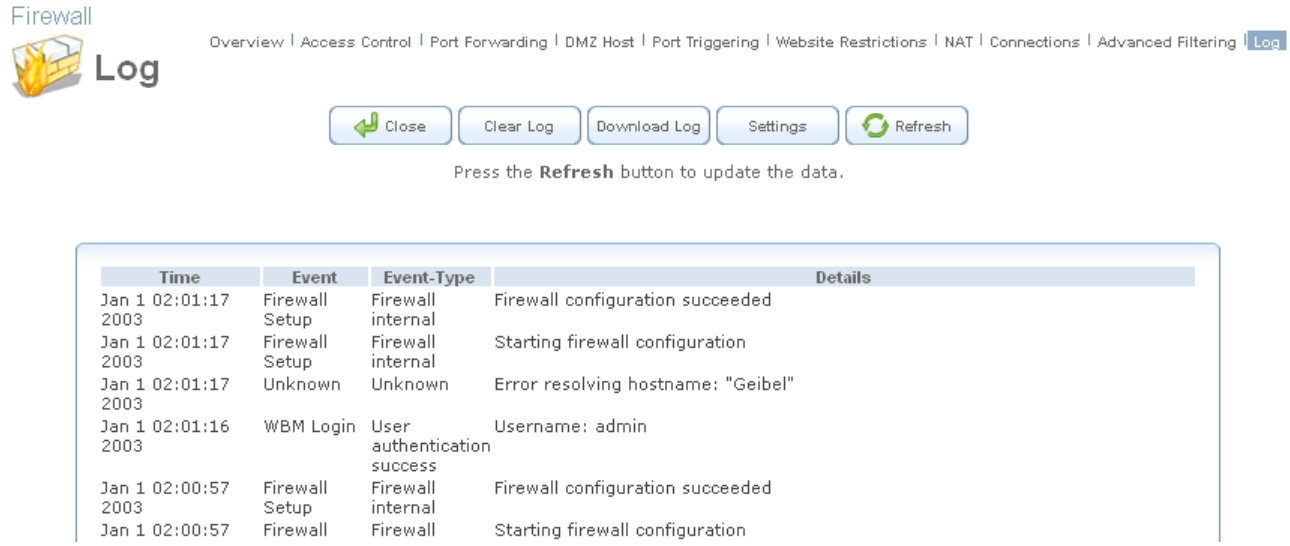


Figure 8-33: Firewall Log

The log's columns are:

Time The time the event occurred.

Event There are five kinds of events:

- Inbound Traffic: The event is a result of an incoming packet.
- Outbound Traffic: The event is a result of outgoing packet.
- Firewall Setup: Configuration message.
- WBM Login: Indicates that a user has logged in to WBM.
- CLI Login: Indicates that a user has logged in to CLI (via Telnet).

Event-Type A textual description of the event:

- Blocked: The packet was blocked. The message is colored red.
- Accepted: The packet was accepted. The message is colored green.

Details More details about the packet or the event, such as protocol, IP addresses, ports, etc.

Use the buttons at the top of the page to:

Close Close the 'Log' screen and return to Watson's home page.

Clear Log Clear all currently displayed log messages.

Download Log Download the log as a Comma Separated Value (CSV) file, named firewall.csv.

Settings View or change the security log settings (explanation follows).

Refresh Refresh the screen to display the latest updated log messages.

To view or change the security log settings:

1. Click the 'Settings' button that appears at the top of the 'Firewall Log' screen. The 'Log Settings' screen appears.

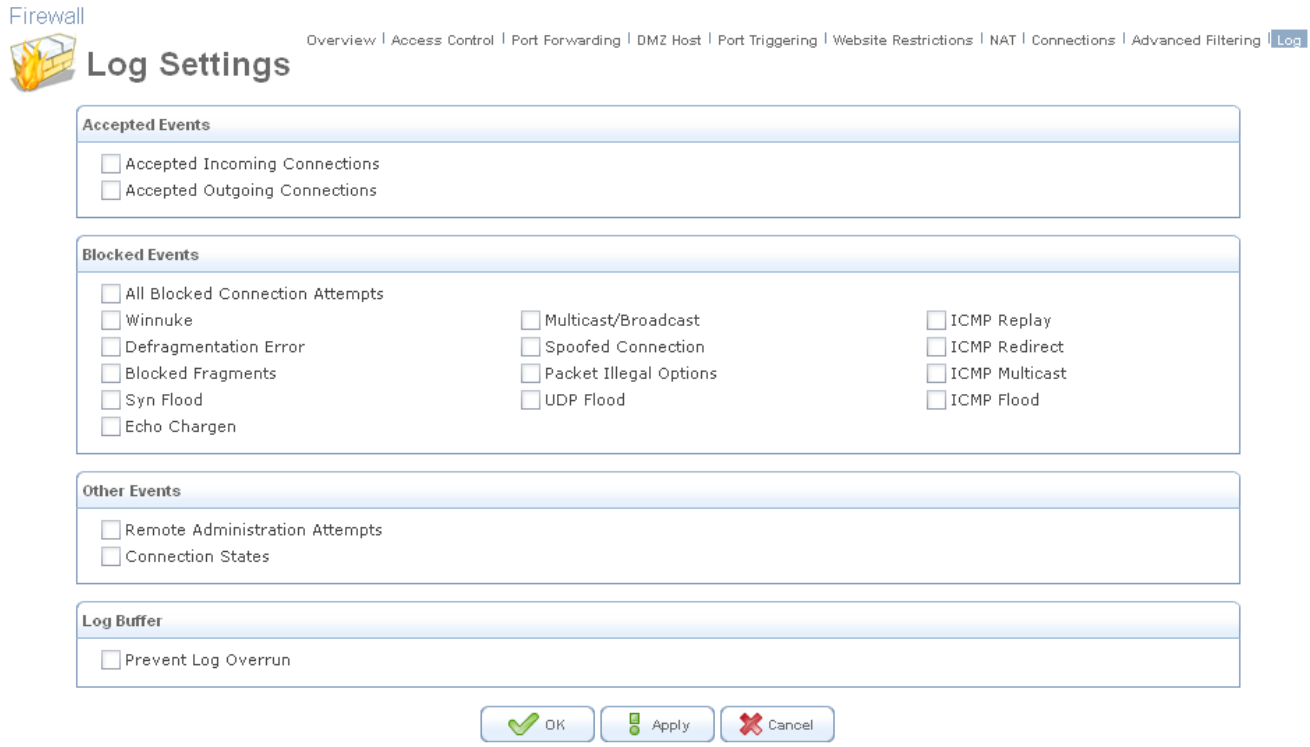


Figure 8-34: Log Settings

2. Select the types of activities for which you would like to have a log message generated:

Accepted Events

- Accepted Incoming Connections: Write a log message for each successful attempt to establish an inbound connection to the home network.
- Accepted Outgoing Connections: Write a log message for each successful attempt to establish an outgoing connection to the public network.

Blocked Events

- All Blocked Connection Attempts: Write a log message for each blocked attempt to establish an inbound connection to the home network or vice versa. You can enable logging of blocked packets of specific types by disabling this option, and enabling some of the more specific options below it.

Other Events

- Remote Administration Attempts: Write a log message for each remote-administration connection attempt, whether successful or not.
- Connection States: Provide extra information about every change in a connection opened by the firewall. Use this option to track connection handling by the firewall and Application Level Gateways (ALGs).

Log Buffer

- Prevent Log Overrun: Select this check box in order to stop logging firewall activities when the memory allocated for the log fills up.

Click 'OK' to save the settings.

The following are the available event types that can be recorded in the firewall log:

- Firewall internal - an accompanying explanation from the firewall internal mechanism will be added in case this event-type is recorded.
- Firewall status changed - the firewall changed status from up to down or the other way around, as specified in the event type description.
- STP packet - an STP packet has been accepted/rejected.
- Illegal packet options - the options field in the packet's header is either illegal or forbidden.
- Fragmented packet - a fragment has been rejected.
- WinNuke protection - a WinNuke attack has been blocked.
- ICMP replay - an ICMP replay message has been blocked.
- ICMP redirect protection - an ICMP redirected message has been blocked.
- Packet invalid in connection - a packet has been blocked, being on an invalid connection.
- ICMP protection - a broadcast ICMP message has been blocked.
- Broadcast/Multicast protection - a packet with a broadcast/multicast source IP has been blocked.
- Spoofing protection - a packet from the WAN with a source IP of the LAN has been blocked.
- DMZ network packet - a packet from a demilitarized zone network has been blocked.
- Trusted device - a packet from a trusted device has been accepted.
- Default policy - a packet has been accepted/blocked according to the default policy.
- Remote administration - a packet designated for Watson management has been accepted/blocked.
- Access control - a packet has been accepted/blocked according to an access control rule.
- Parental control - a packet has been blocked according to a parental control rule.
- NAT out failed - NAT failed for this packet.
- DHCP request - Watson sent a DHCP request (depends on the distribution).
- DHCP response - Watson received a DHCP response (depends on the distribution).
- DHCP relay agent - a DHCP relay packet has been received (depends on the distribution).
- IGMP packet - an IGMP packet has been accepted.
- Multicast IGMP connection - a multicast packet has been accepted.
- RIP packet - a RIP packet has been accepted.
- PPTP connection - a packet inquiring whether Watson is ready to receive a PPTP connection has been accepted.
- Kerberos key management 1293 - security related, for future use.
- Kerberos 88 - for future use.

- AUTH:113 request - an outbound packet for AUTH protocol has been accepted (for maximum security level).
- Packet-Cable - for future use.
- IPV6 over IPV4 - an IPv6 over IPv4 packet has been accepted.
- ARP - an ARP packet has been accepted.
- PPP Discover - a PPP discover packet has been accepted.
- PPP Session - a PPP session packet has been accepted.
- 802.1Q - a 802.1Q (VLAN) packet has been accepted.
- Outbound Auth1X - an outbound Auth1X packet has been accepted.
- IP Version 6 - an IPv6 packet has been accepted.
- Watson initiated traffic - all traffic that Watson initiates is recorded.
- Maximum security enabled service - a packet has been accepted because it belongs to a permitted service in the maximum security level.
- SynCookies Protection - a SynCookies packet has been blocked.
- ICMP Flood Protection - a packet has been blocked, stopping an ICMP flood.
- UDP Flood Protection - a packet has been blocked, stopping a UDP flood.
- Service - a packet has been accepted because of a certain service, as specified in the event type.
- Advanced Filter Rule - a packet has been accepted/blocked because of an advanced filter rule.
- Fragmented packet, header too small - a packet has been blocked because after the defragmentation, the header was too small.
- Fragmented packet, header too big - a packet has been blocked because after the defragmentation, the header was too big.
- Fragmented packet, drop all - not used.
- Fragmented packet, bad align - a packet has been blocked because after the defragmentation, the packet was badly aligned.
- Fragmented packet, packet too big - a packet has been blocked because after the defragmentation, the packet was too big.
- Fragmented packet, packet exceeds - a packet has been blocked because defragmentation found more fragments than allowed.
- Fragmented packet, no memory - a fragmented packet has been blocked because there was no memory for fragments.
- Fragmented packet, overlapped - a packet has been blocked because after the defragmentation, there were overlapping fragments.
- Defragmentation failed - the fragment has been stored in memory and blocked until all fragments arrived and defragmentation could be performed.
- Connection opened - usually a debug message regarding a connection.
- Wildcard connection opened - usually a debug message regarding a connection.
- Wildcard connection hooked - usually debug message regarding connection.
- Connection closed - usually a debug message regarding a connection.
- Echo/Chargen/Quote/Snork protection - a packet has been blocked, protecting from Echo/Chargen/Quote/Snork.
- First packet in connection is not a SYN packet - a packet has been blocked because of a TCP connection that had started without a SYN packet.

- Error: No memory - a message notifying that a new connection has not been established because of lack of memory.
- NAT Error : Connection pool is full - a message notifying that a connection has not been created because the connection pool is full.
- NAT Error: No free NAT IP - a message notifying that there is no free NAT IP, therefore NAT has failed.
- NAT Error: Conflict Mapping already exists - a message notifying that there is a conflict since the NAT mapping already exists, therefore NAT has failed.
- Malformed packet: Failed parsing - a packet has been blocked because it is malformed.
- Passive attack on ftp-server: Client attempted to open Server ports - a packet has been blocked because of an unauthorized attempt to open a server port.
- FTP port request to 3rd party is forbidden (Possible bounce attack) - a packet has been blocked because of an unauthorized FTP port request.
- Firewall Rules were changed - the firewall rule set has been modified.
- User authentication - a message during login time, including both successful and failed authentication.
- First packet is Invalid - First packet in connection failed to pass firewall or NAT

8.2.11 Applying Corporate-Grade Security

The following set of instructions is designed to assist you in applying corporate-grade security standards to your network. When implementing these instructions, it is important to execute the configuration steps in the exact order they are presented. To apply corporate-grade firewall security standards perform the following:

- Do not allow non-administrative services access to the LAN:

1. Open a Telnet session from a LAN host that is connected to Watson.
2. Telnet to Watson at address 192.168.1.1.
3. Logon to Watson as an administrator (the default username is "admin" and the password is "admin").
4. After logging on, issue the following command at the prompt:

```
Watson> conf set fw/protect/allow_rg_remote_administration_only 1
Watson> conf reconf 1
Watson> exit
```

- Configure Watson to permit only HTTPS as means of remote administration:

1. Click the 'Management' tab under 'System'.
2. Click the 'Remote Administration' tab.
3. Enable the following check boxes:
4. Using Primary HTTPS Port (443)
5. Using Secondary HTTPS Port (8443)
6. Disable all other check boxes.

7. Click 'OK' to save the settings.

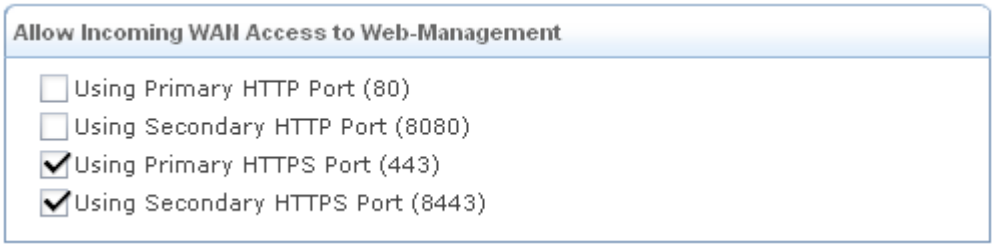

Allow Incoming WAN Access to Web-Management
Using Primary HTTP Port (80)
Using Secondary HTTP Port (8080)
Using Primary HTTPS Port (443)
Using Secondary HTTPS Port (8443)

Figure 8-35: Enabling Secure Remote Administration

- Apply firewall protection on the LAN:

1. Click the 'Network Connections' tab under 'System'.
2. Click the 'LAN Ethernet' connection link.
3. Click the 'Advanced' button.
4. Enable the 'Internet Connection Firewall' check box.
5. Click 'OK' to save the settings.

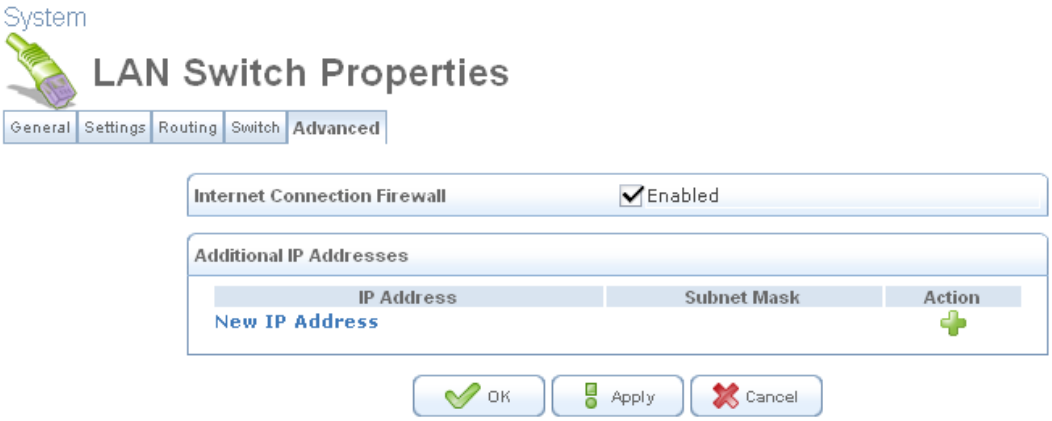


Figure 8-36: Apply Firewall Protection

At this point you have set your firewall to corporate-grade security. If you wish to allow additional LAN services, or other outbound services, refer to the 'Advanced Filtering' section 8.2.9.

8.3 Quality of Service

Network-based applications and traffic are growing at a high rate, producing an ever-increasing demand for bandwidth and network capacity. For obvious reasons, bandwidth and capacity cannot be expanded infinitely, requiring that bandwidth-demanding services be delivered over existing infrastructure, without incurring additional, expansive investments.

The next logical means of ensuring optimal use of existing resources are Quality of Service (QoS) mechanisms for congestion management and avoidance. Quality of Service refers to the capability of a network device to provide better service to se-

lected network traffic. This is achieved by shaping the traffic and processing higher priority traffic before lower priority traffic.

As Quality of Service is dependent on the ”weakest link in the chain”, failure of a single component along the data path to assure priority packet transmission can easily cause a VoIP call or a Video on Demand (VoD) broadcast to fail miserably. QoS must therefore obviously be addressed end-to-end.

8.3.1 Overview

The 'General' screen provides a Quality of Service "wizard", with which you can configure your QoS parameters according to predefined profiles, with just a few clicks. A chosen QoS profile will automatically define QoS rules, which you can view and edit in the rest of the QoS tab screens, described later.

Selecting a QoS profile will cause all previous QoS configuration settings to be permanently lost.

Click the QoS tab under 'Services'. The 'General' screen appears with the 'Overview' link being selected.

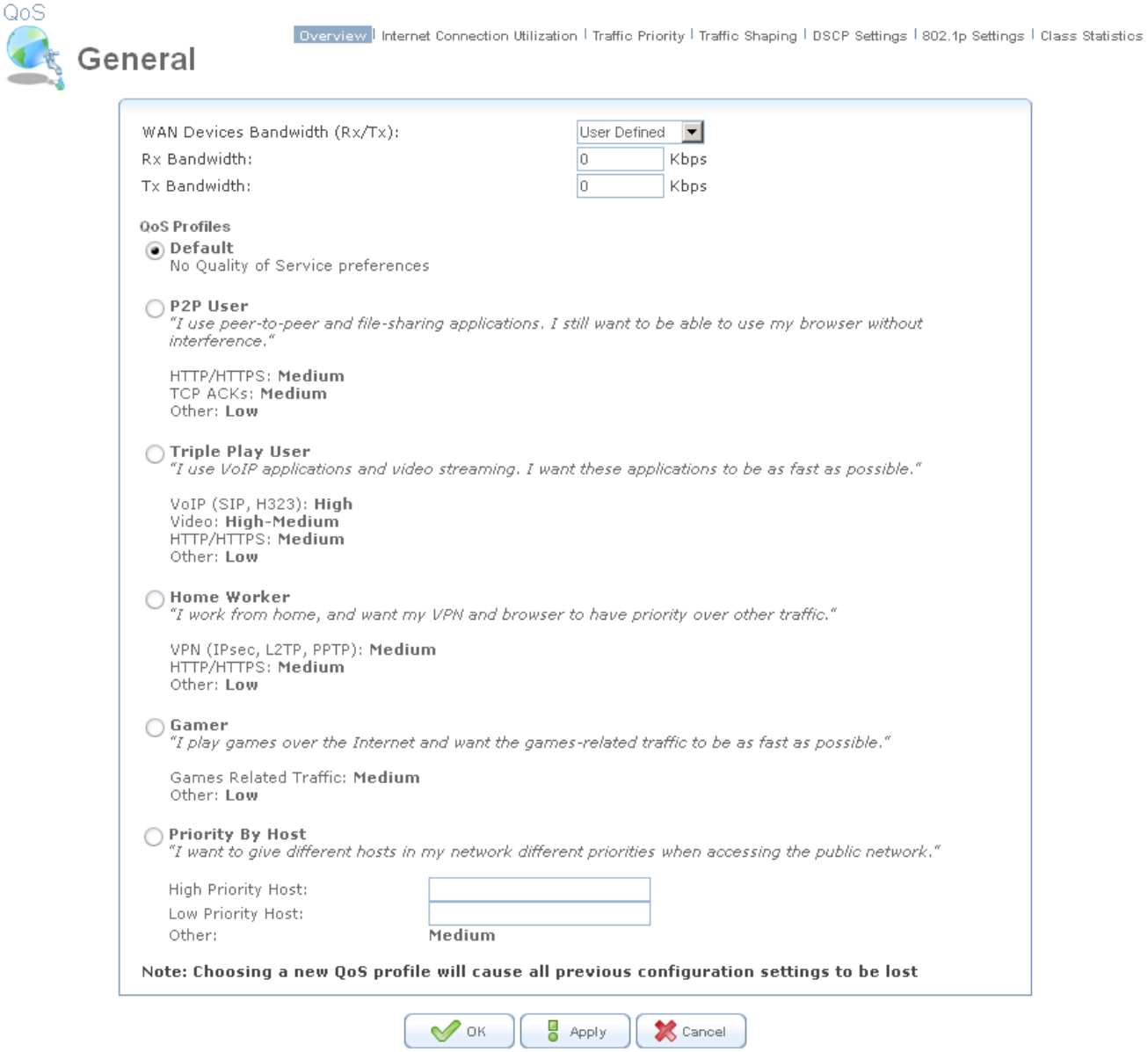


Figure 8-37: General

WAN Devices Bandwidth (Rx/Tx) Before selecting the QoS profile that mostly suits your needs, select your bandwidth from this drop-down menu. If you do not see an appropriate entry, select 'User Defined', and enter your Tx and Rx bandwidths manually.

- **Tx Bandwidth** This parameter defines the gateway's outbound transmission rate. Enter your Tx bandwidth in Kbits per second.

- **Rx Bandwidth** This parameter defines the gateway's Internet traffic reception rate. Enter your Rx bandwidth in Kbits per second.

Entering inaccurate Tx/Rx values will cause incorrect behavior of the QoS module. It is important to set these fields as accurately as possible.

Best QoS results can be achieved when using the SHDSL connection speed for the Tx/Rx values

QoS Profiles Select the profile that mostly suits your bandwidth usage. Each profile entry displays a quote describing what the profile is best used for, and the QoS priority levels granted to each bandwidth consumer in this profile.

- Default – No QoS preferences, however the device is limited by the requested bandwidth, if specified. Queuing policy will be based on the pre-defined priority levels defined in the DSCP and 802.1q settings.
- P2P User – Peer-to-peer and file sharing applications will receive priority.
- Triple Play User – VoIP and video streaming will receive priority.
- Home Worker – VPN and browsing will receive priority.
- Gamer – Game-related traffic will receive priority.
- Priority By Host – This entry provides the option to configure which computer in your LAN will receive the highest priority and which the lowest. If you have additional computers, they will receive medium priority.

It is easier to configure the Watson QoS by selecting one of the proposed QoS profiles and then to modify the settings to fit your needs, than to start with the default profile.

High Priority Host Enter the host name or IP address of the computer to which you would like to grant the highest bandwidth priority.

Low Priority Host Enter the host name or IP address of the computer to which you would like to grant the lowest bandwidth priority.

8.3.2 Internet Connection Utilization

The 'Internet Connection Utilization' screen provides application level usage information of your Internet connection's bandwidth. You can view what application on which LAN computer is using how much bandwidth, at any given time. This information is provided in both application and computer views.

8.3.2.1 Application View

By default, the information is presented in "By Application" view. The screen refreshes constantly. You can stop its refreshing by using the 'Auto Refresh Off' button at the bottom of the screen.

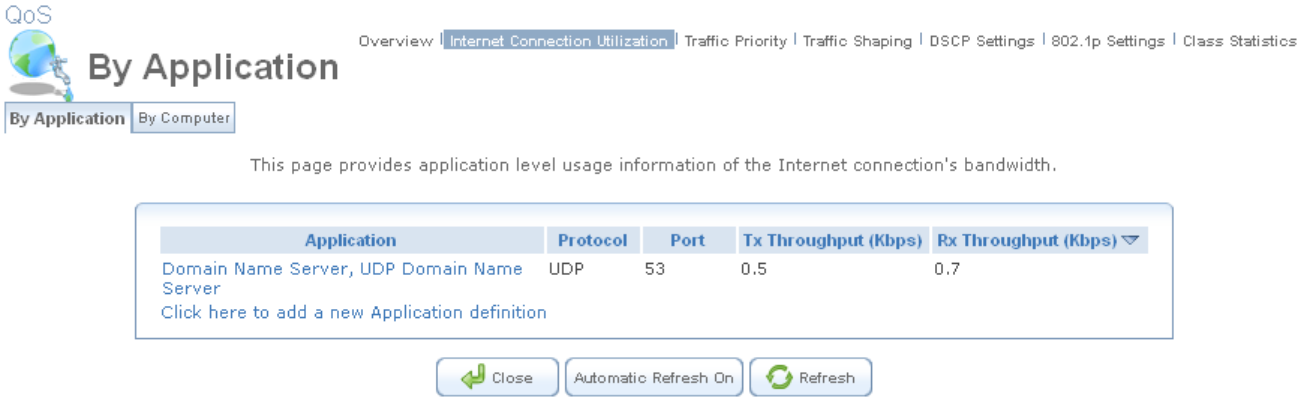


Figure 8-38: Internet Connection Utilization by Application

The table displays the following information fields. Note that you can sort the table according to these fields (ascending or descending), by clicking the fields' names.

Application The type of application using the bandwidth.

Protocol The application's network protocol.

Port The port through which traffic is transferred.

Tx Throughput The transmission bit rate in kilo-bits per second.

Rx Throughput The reception bit rate in kilo-bits per second.

Watson does not recognize all possible applications running on LAN computers, and marks such an application as "Unknown". You can define an unknown application by clicking the 'Click Here to Add a New Application Definition' link at the bottom of the table. The 'Protocols' screen appears, in which you can define the application by adding it as a new service entry. To learn more about adding protocols, refer to Section 9.9.1.

Furthermore, you can click each application's name to view its details, particularly which LAN computer is running it.

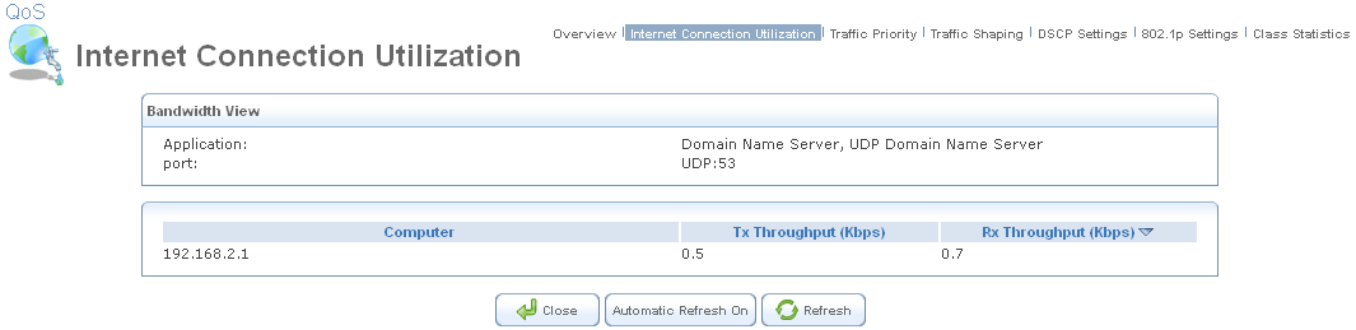


Figure 8-39: A Specific Application

In this example, the application "Domain Name Server" is running on computer 192.168.2.1, using UDP protocol on port 53. This screen provides a combined application and computer view, and enables you to select the general traffic priorities for that computer.

8.3.2.2 Computer View

The "By Computer" tab presents a table displaying the sum of bandwidth used by each LAN computer. The fields displayed are the computer's IP address and the Tx and Rx throughput.

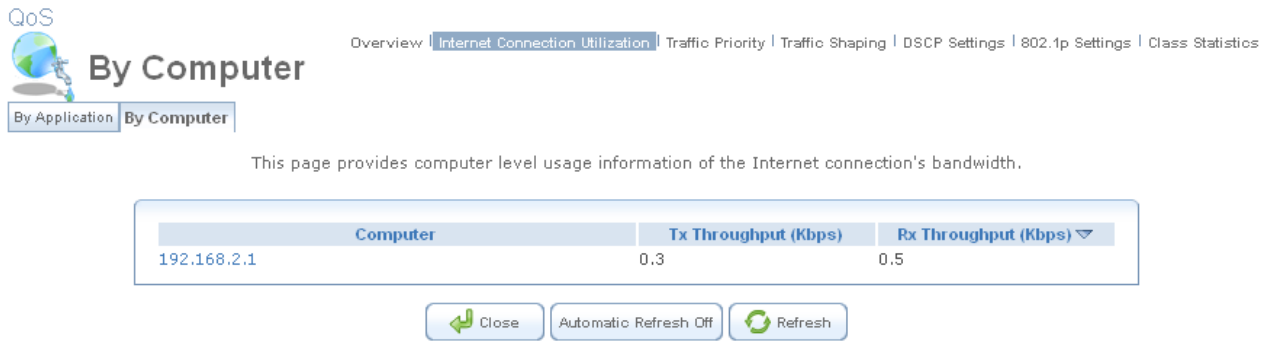


Figure 8-40: Internet Connection Utilization by Computer

Click a computer's IP address to view the bandwidth-consuming applications running on that computer.

8.3.3 Traffic Priority

Traffic Priority allows you to manage and avoid traffic congestion by defining inbound and outbound priority rules for each device on your gateway. These rules determine the priority that packets, traveling through the device, will receive. QoS parameters (DSCP marking and packet priority) are set per packet, on an application basis. You can set QoS parameters using flexible rules, according to the following parameters:

- Source/destination IP address, MAC address or host name
- Device
- Source/destination ports
- Limit the rule for specific days and hours

Watson supports two priority marking methods for packet prioritization:

- DSCP (refer to Section 8.3.5).
- 802.1p Priority (refer to Section 8.3.6).

The matching of packets by rules is connection-based, known as Stateful Packet Inspection (SPI), using the same connection-tracking mechanism used by Watson's firewall. Once a packet matches a rule, all subsequent packets with the same attributes receive the same QoS parameters, both inbound and outbound. A packet can match more than one rule. Therefore:

- The first class rule has precedence over all other class rules (scanning is stopped once the first rule is reached).

- The first traffic-priority (classless) rule has precedence over all other traffic-priority rules.
- There is no prevention of a traffic-priority rule conflicting with a class rule. In this case, the priority and DSCP setting of the class rule (if given) will take precedence.

Connection-based QoS also allows inheriting QoS parameters by some of the applications that open subsequent connections. For instance, you can define QoS rules on SIP, and the rules will apply to both control and data ports (even if the data ports are unknown). This feature applies to all applications that have ALG in the firewall, such as:

- SIP
- MSN Messenger/Windows Messenger
- TFTP
- FTP
- MGCP
- H.323
- Port Triggering applications (refer to Section 8.2.5)
- PPTP
- IPSec

To set traffic priority rules:

1. Under the 'QoS' menu item, click 'Traffic Priority'. The 'Traffic Priority' screen appears. This screen is divided into two identical sections, one for 'QoS input rules' and the other for 'QoS output rules', which are for prioritizing inbound and outbound traffic, respectively. Each section lists all the gateway devices on which rules can be set. You can set rules on all devices at once, using the 'All devices' entry.

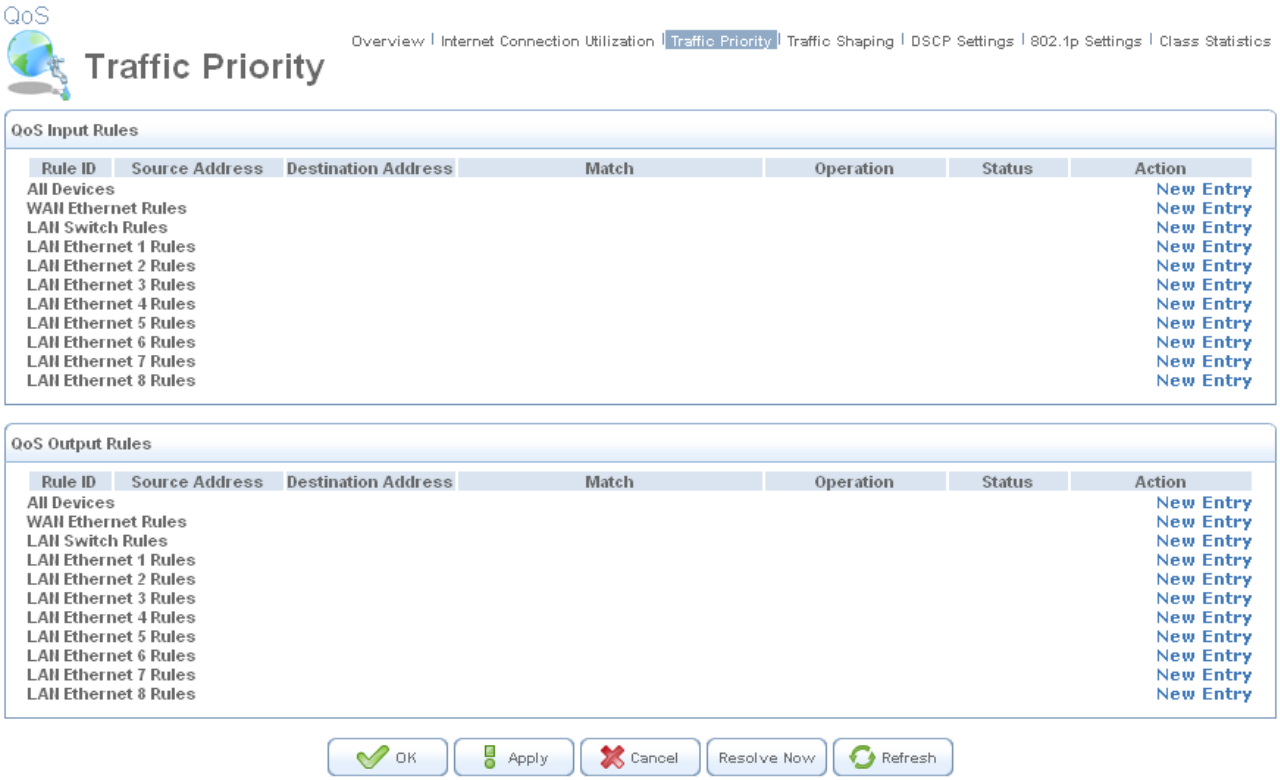


Figure 8-41: Traffic Priority

2. After choosing the traffic direction and the device on which to set the rule, click the appropriate 'New Entry' link. The 'Add Traffic Priority Rule' screen appears.

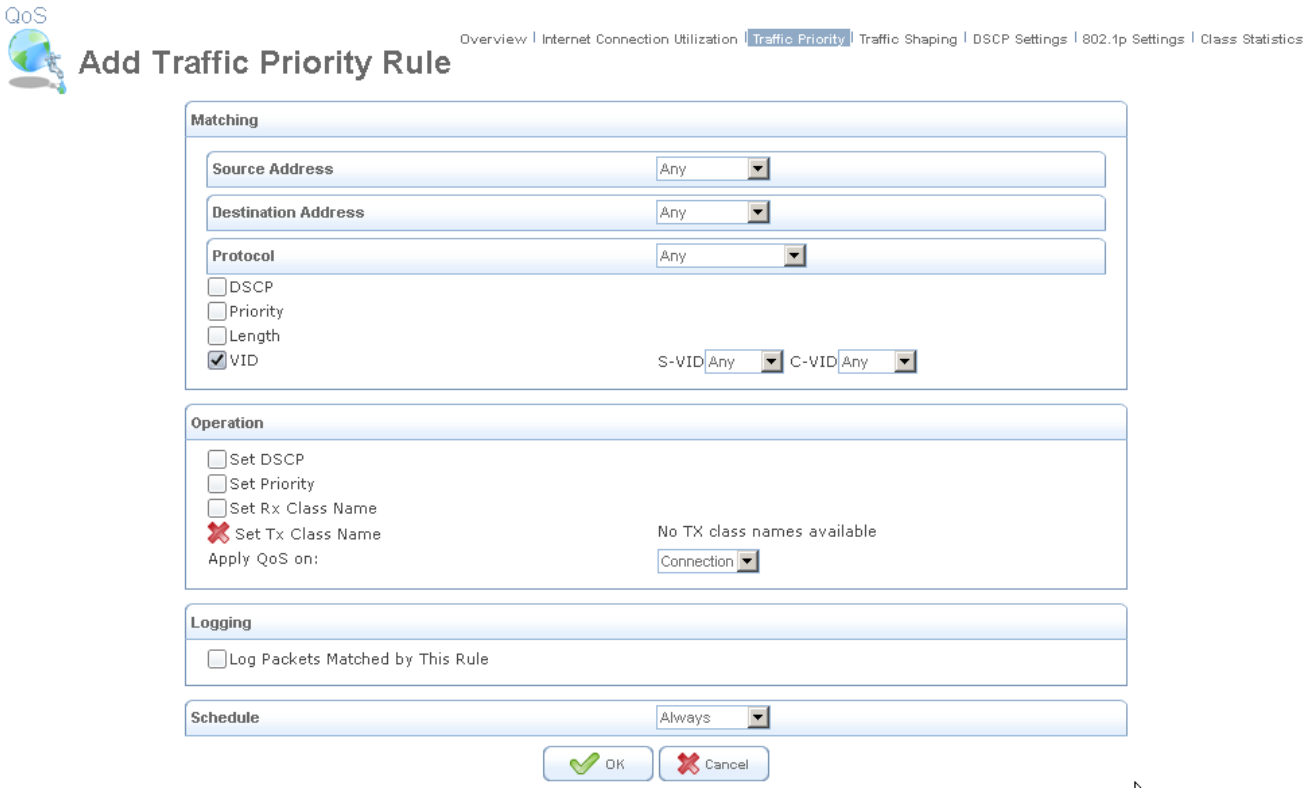


Figure 8-42: Add Traffic Priority Rule

This screen is divided into two main sections, 'Matching' and 'Operation', which are for defining the operation to be executed when matching conditions apply.

Matching Use this section to define characteristics of the packets matching the rule.

- **Source Address** The source address of packets sent or received by Watson. The drop-down menu displays the names or IP addresses of the hosts currently connected to Watson's LAN, as well as the options 'Any' and 'User Defined'. Select an address or name from the list to apply the rule on the corresponding host, or 'Any' to apply the rule on all Watson's LAN hosts. If you would like to add a new address, select the 'User Defined' option in the drop-down menu. This will commence a sequence that will add a new network object, representing the new host. Refer to Section 9.9.2 in order to learn how to do so.
- **Destination Address** The destination address of packets sent or received by Watson. This address can be configured in the same manner as the source address. This entry enables further filtration of the packets.
- **Protocol** You may also specify a traffic protocol. Selecting the 'Show All Services' option from the drop-down menu will expand the list of available protocols. Select a protocol or add a new one using the 'User Defined' option. This will commence a sequence that will add a new service, representing the protocol. Refer to Section 9.9.1 in order to learn how to do so.

Using a protocol requires observing the relationship between a client and a server, in order to distinguish between the source and destination ports. For example, let's assume you have an FTP server in your LAN, serving clients inquiring from the WAN. You want to apply a QoS rule on incoming packets from any port on the WAN (clients) trying to access FTP port 21 (your server), and the same for outgoing packets from port 21 trying to access any port on the WAN. Therefore, you must set the following QoS rules:

In the 'Matching' section of 'QoS Input Rules', set the 'Protocol' drop-down menu to: TCP Any -> 21 (available as a predefined service, named FTP).

In the 'Matching' section of 'QoS Output Rules', set the 'Protocol' drop-down menu to: TCP 21 -> Any (must be created as a 'User Defined' service).

- **DSCP** Select this check box to display two DSCP fields, which enable you to specify a hexadecimal DSCP value and its mask assigned to the packets matching the priority rule.
- **Priority** Select this check box to display a drop-down menu, in which you can select a 802.1Q priority level assigned to the packets matching the priority rule.
- **Length** Select this check box if you would like to specify the length of packets, or the length of their data portion.
- **VID** Select this check box to if you would like to match specific S-VID (service provider VLAN ID) and/or C-VID (customer VLAN ID

Operation Perform the following operation/s on packets that match the priority rule.

- **Set DSCP** Select this check box if you would like to change the DSCP value on packets matching the rule, prior to routing them further. The screen will refresh, enabling you to enter the hexadecimal DSCP value in its respective field that appears.

Figure 8-43: Set DSCP Rule

- **Set Priority** Select this check box if you would like to change a priority of the packets matching the rule. The screen will refresh (see Figure 8-44), enabling you to select between one of eight priority levels, zero being the lowest and seven the highest. Each priority level is assigned a default queue number, where Queue 0 has the lowest priority. The matching between a priority level and a queue number can be edited in the '802.1p Settings' screen (for more information, refer to Section 8.3.6).

Figure 8-44: Set Priority with Queueing

- **Set Rx Class Name** For QoS input rules, packets matching the rule will be assign to an Rx Class see Section 8.3.4.4 .
- **Set Tx Class Name** For QoS output rules, packets matching the rule will be assign to a TX Class.

- **Apply QoS on** Select whether to apply QoS on a connection or just the first packet. When applying on a connection, the data transfer session will be handled using Stateful Packet Inspection (SPI). This means that other packets matching this rule will be automatically allowed to access, and the same QoS scheme will be applied to them.

Logging Monitor the rule.

- **Log Packets Matched by This Rule** Select this check box to log the first packet from a connection that was matched by this rule.

Schedule By default, the rule will always be active. However, you can configure scheduler rules by selecting 'User Defined', in order to define time segments during which the rule may be active. To learn how to configure scheduler rules, refer to Section 9.9.3.

3. Click 'OK' to save the settings.

The order of the rules' appearance represents both the order in which they were defined and the sequence by which they will be applied. You may change this order after your rules are already defined (without having to delete and then re-add them), by using the action icon and action icon .

8.3.4 Traffic Shaping

Traffic Shaping is the solution for managing and avoiding congestion where a high speed LAN meets limited broadband bandwidth. A user may have, for example, a 100 Mbps Ethernet LAN with a 100 Mbps WAN interface router. The router may communicate with the ISP using a modem with a bandwidth of 2Mbps. This typical configuration makes the modem, having no QoS module, the bottleneck.

The router sends traffic as fast as it is received, while its well-designed QoS algorithms are left unused. Traffic shaping limits the bandwidth of the router, artificially forcing the router to be the bottleneck. A traffic shaper is essentially a regulated queue that accepts uneven and/or bursty flows of packets and transmits them in a steady, predictable stream so that the network is not overwhelmed with traffic. While Traffic Priority allows basic prioritization of packets, Traffic Shaping provides more sophisticated definitions. Such are:

- Bandwidth limit for each device
- Bandwidth limit for classes of rules
- Prioritization policy
- TCP serialization on a device

Additionally, you can define QoS traffic shaping rules for a default device. These rules will be used on a device that has no definitions of its own. This enables the definition of QoS rules on Default WAN, for example, and their maintenance even if the PPP or bridge device over the WAN is removed.

8.3.4.1 Traffic Classes

The bandwidth of a device can be divided in order to reserve constant portions of bandwidth to predefined traffic types. Such a portion is known as a Traffic Class. When not used by its predefined traffic type, or owner (for example VoIP), the

bandwidth will be available to all other traffic. However when needed, the entire class is reserved solely for its owner.

Moreover, you can limit the maximum bandwidth that a class can use even if the entire bandwidth is available. When a shaping class is first defined for a specific traffic type, two shaping classes are created. The second class is the 'Default Class', which is responsible for all the packets that do not match the defined shaping class, or any other classes that may be defined on the device. You can also define wildcard devices, such as all WAN devices. This can be viewed in the 'Class Statistics' screen (see Figure 8-58).

8.3.4.2 Device Traffic Shaping

This section describes the different Traffic Shaping screens and terms, and presents the feature's configuration logic.

Click 'Traffic Shaping' under the QoS tab in the 'Services' screen. The 'Traffic Shaping' screen appears.

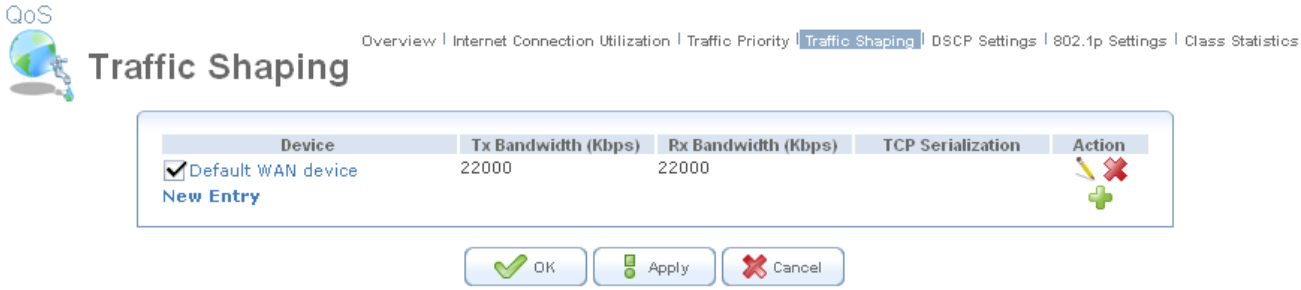


Figure 8-45: Traffic Shaping

Click the 'New Entry' link. The 'Add Device Traffic Shaping' screen appears.

Select the device for which you would like to shape the traffic. The drop-down menu includes all your gateway's devices, and you can select either a specific device for which to shape the traffic, or 'Any Device' to add a traffic shaping class to all devices. In this example, select the WAN Ethernet option.

If you would like to configure Watson's LAN traffic transmission/reception rate, select the relevant LAN device. If you would like to apply the settings on all LAN devices, select the 'Default LAN Device' entry.

1. Click 'OK'. The 'Edit Device Traffic Shaping' screen appears.

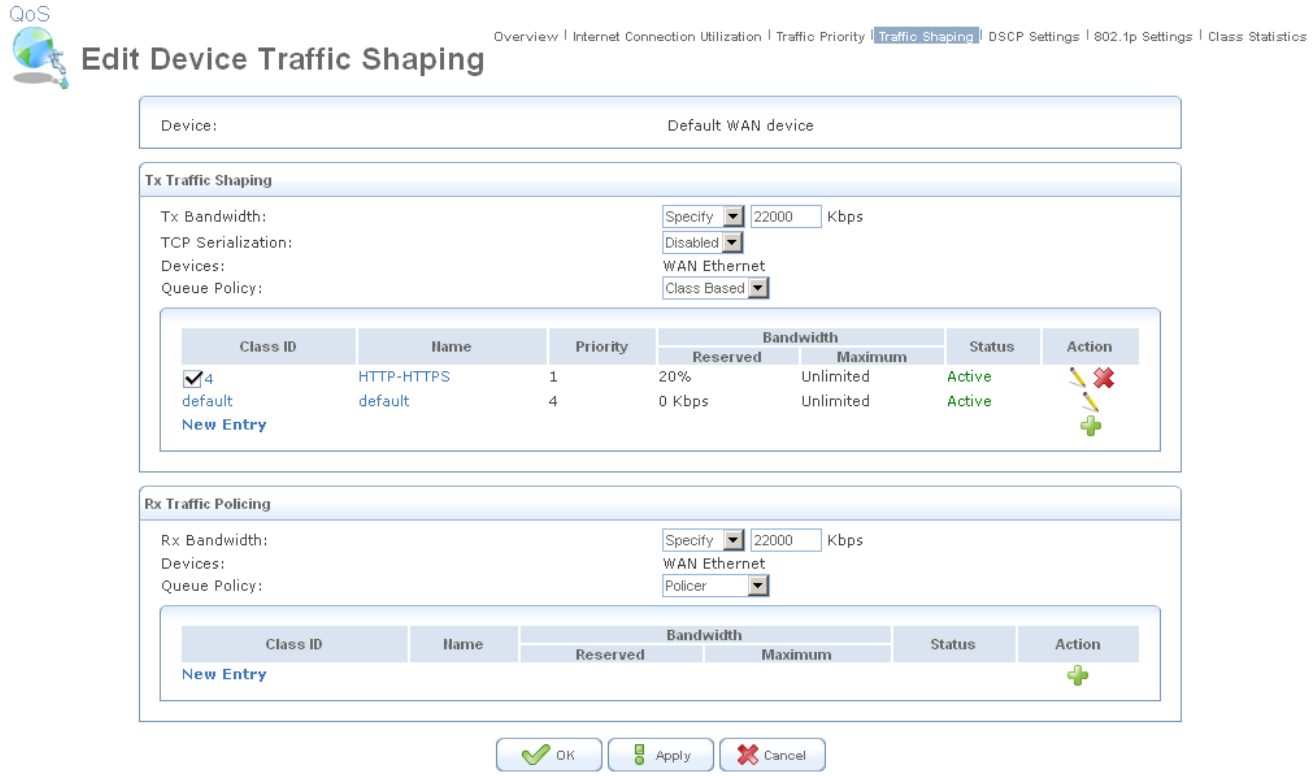


Figure 8-46: Edit Device Traffic Shaping

8.3.4.3 Tx Traffic Shaping

The bandwidth of a device can be divided in order to reserve constant portions of bandwidth to predefined traffic types. Such a portion is known as a Shaping Class. When not used by its predefined traffic type, or owner (for example VoIP), the class will be available to all other traffic. However when needed, the entire class is reserved solely for its owner. Moreover, you can limit the maximum bandwidth that a class can use even if the entire bandwidth is available.

Configure the following fields:

- **Tx Bandwidth** This parameter limits the gateway's bandwidth transmission rate. The purpose is to limit the bandwidth of the WAN device to that of the weakest outbound link, for instance, the SHDSL connection speed.

- **TCP Serialization** You can enable TCP Serialization in its drop-down menu, either for active voice calls only or for all traffic. The screen will refresh, adding a 'Maximum Delay' field (see Figure 8-47). This function allows you to define the maximal allowed transmission time frame (in milliseconds) of a single packet. Any packet that requires a longer time to be transmitted, will be fragmented to smaller sections. This avoids transmission of large, bursty packets that may cause delay or jitter for real-time traffic such as VoIP. If you insert a delay value in milliseconds, the delay in number of bytes will be automatically updated on refresh.

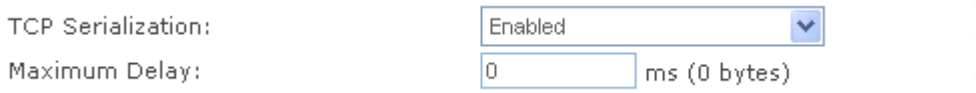


Figure 8-47: TCP Serialization – Maximum Delay

Queue Policy Tx traffic queueing can be based on a shaping class (see the following explanations) or on the pre-defined priority levels (refer to Section 8.3.3). Note that when it is based on a shaping class, the class's bandwidth requirements will be met regardless of the priority, and only excess bandwidth will be given to traffic with a higher priority. However, when unlimited bandwidth is selected for the Tx traffic, the queue policy can only be based on the pre-defined priority levels.

To define a Tx Traffic Shaping Class:

Click the 'New Entry' link in the 'Tx Traffic Shaping' section of the 'Edit Device Traffic Shaping' screen. The 'Add Shaping Class' screen appears.

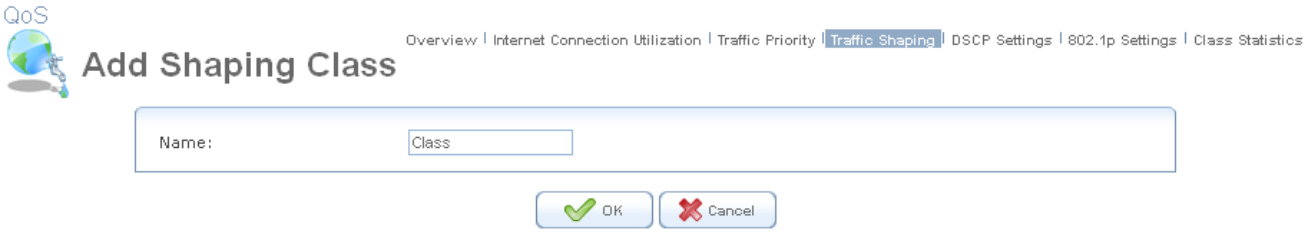

QoS
Add Shaping Class
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
Name:
Class
OK
Cancel

Figure 8-48: Add Shaping Class

1. Name the new class and click 'OK' to save the settings, e.g. Class A.

2. Back in the 'Edit Device Traffic Shaping' screen, click the class name to edit the shaping class. Alternatively, click its action icon . The 'Edit Shaping Class' screen appears.

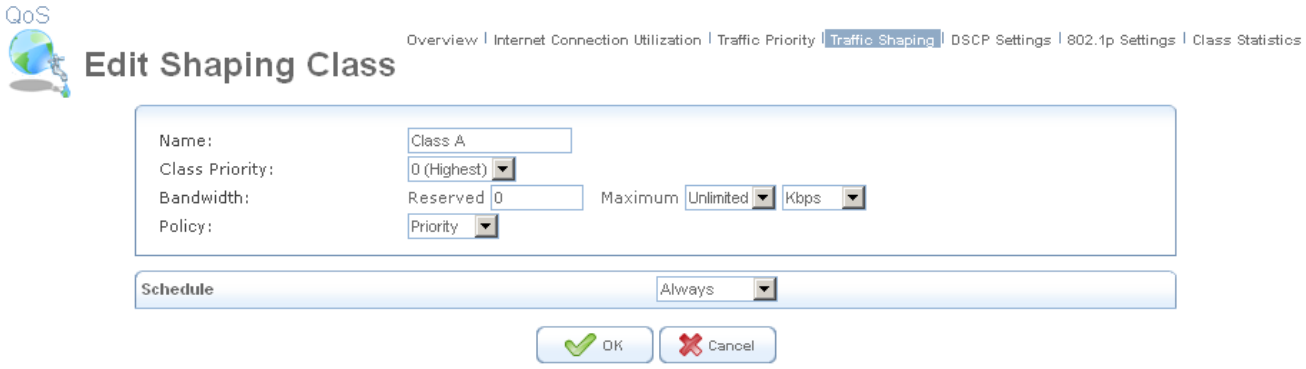


Figure 8-49: Edit Shaping Class

Configure the following fields:

Name The name of the class.

Class Priority The class can be granted one of eight priority levels, zero being the highest and seven the lowest (note the obversion when compared to the rules priority levels). This level sets the priority of a class in comparison to other classes on the device.

Bandwidth The reserved transmission bandwidth in kilo-bits per second. You can limit the maximum allowed bandwidth by selecting the 'Specify' option in the drop-down menu. The screen will refresh, adding another Kbits/s field.

Figure 8-50: Specify Maximum Bandwidth

Policy The class policy determines the policy of routing packets inside the class. Select one of the four options:

- **Priority** Priority queuing utilizes multiple queues, so that traffic is distributed among queues based on priority. This priority is defined according to packet's priority, which can be defined explicitly, by a DSCP value (refer to Section 8.3.5), or by a 802.1p value (refer to Section 8.3.6).
- **FIFO** The "First In, First Out" priority queue. This queue ignores any previously-marked priority that packets may have.
- **Fairness** The fairness algorithm ensures no starvation by granting all packets a certain level of priority.
- **RED** The Random Early Detection algorithm utilizes statistical methods to drop packets in a "probabilistic" way before queues overflow. Dropping packets in this way slows a source down enough to keep the queue steady and reduces the number of packets that would be lost when a queue overflows and a host is transmitting at a high rate.
- **WRR** Weighted Round Robin utilizes a process scheduling function that prioritizes traffic according to the pre-defined 'Weight' parameter of a traf-

fic's class. This level of prioritizing provides more flexibility in distributing bandwidth between traffic types, by defining additional classes within a parent class.

- **HTB** Hierarchical Tocken Bucket allows using one single physical link to simulate multiple slower links and to send different kinds of traffic on different simulated links. In both cases, one has to specify how to divide the physical link into simulated links and how to decide which simulated link a given packet is to be sent across.

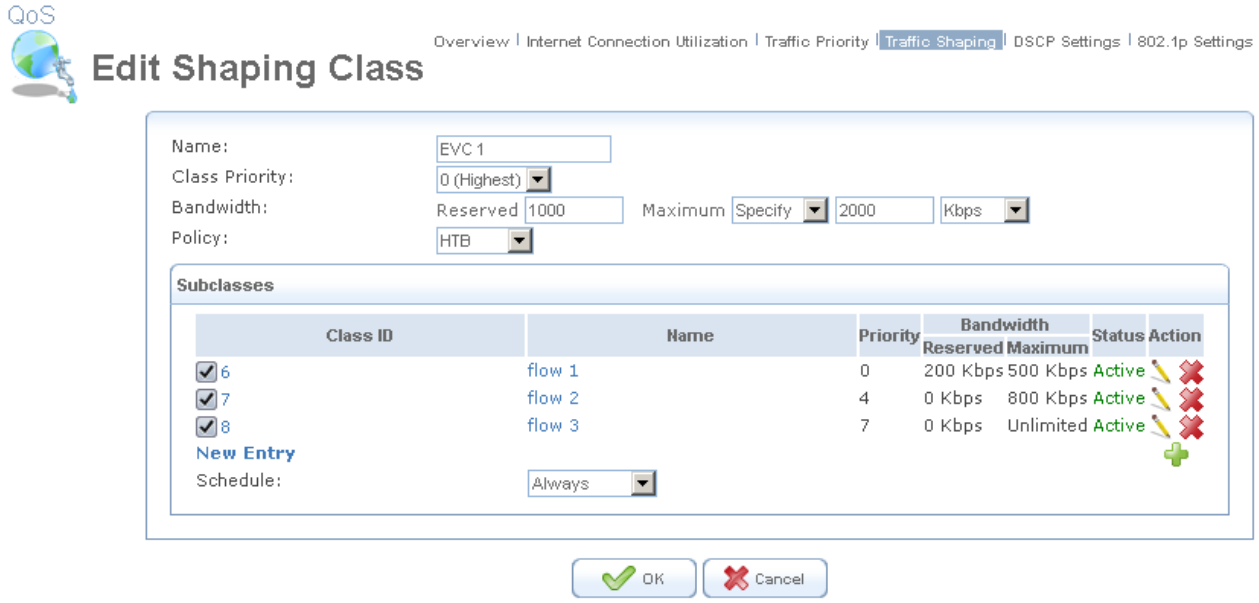


Figure 8-51: Hierarchical Tocken Bucket

Schedule By default, the class will always be active. However, you can configure scheduler rules in order to define time segments during which the class may be active. To learn how to configure scheduler rules, refer to Section 9.9.3.

8.3.4.4 Rx Traffic Policing

Create a new entry in the Device Traffic Shaping for a LAN device. The procedure is described in Section 8.3.4.1.

In the Edit Traffic Shaping configure the following Rx Traffic Policing fields:

Rx Bandwidth This parameter limits the device's bandwidth reception rate. In this example, the purpose is to limit the bandwidth that the WAN device can receive from the SHDSL connection.

Queue Policy Similar to Tx traffic, Rx traffic queueing can be based on a shaping class or on strict priority (unless unlimited bandwidth is selected). By default, however, the queue policy is set to Policer, which is a relatively simple method of bandwidth control. With the policer option, you can dedicate a portion of the bandwidth to a certain traffic type. This portion will always remain available to its traffic type, even when not in use. This is a simpler method, as prioriy is not used at all.

When selecting a class based queue policy, you must define an Rx Traffic Policy Class, which is identical to defining a Tx Traffic Shaping Class, described earlier. However if you select the policer as your queue policy, defining a policing class is even simpler, as it lacks the priority setup.

To define an Rx Traffic Policy Class:

1. Click the 'New Entry' link in the 'Rx Traffic Policing' section of the 'Edit Device Traffic Shaping' screen. The 'Add Policing Class' screen appears.

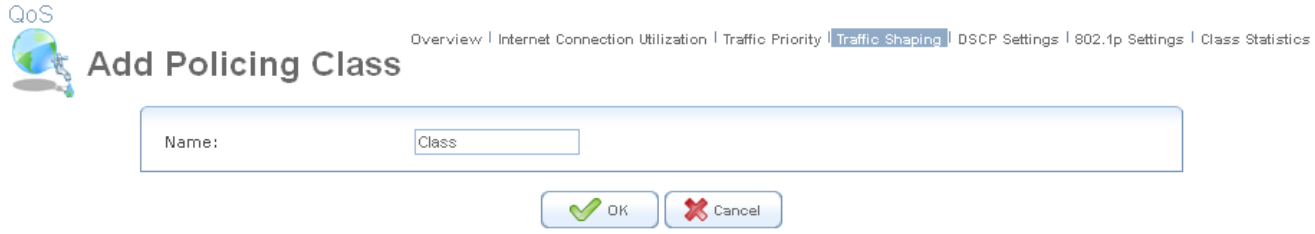

QoS
Add Policing Class
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
Name:
Class
OK
Cancel

Figure 8-52: Add Policing Class

2. Name the new class and click 'OK' to save the settings, e.g. Class B.

3. Back in the 'Edit Device Traffic Shaping' screen, click the class name to edit the shaping class. Alternatively, click its action icon . The 'Edit Policing Class' screen appears.

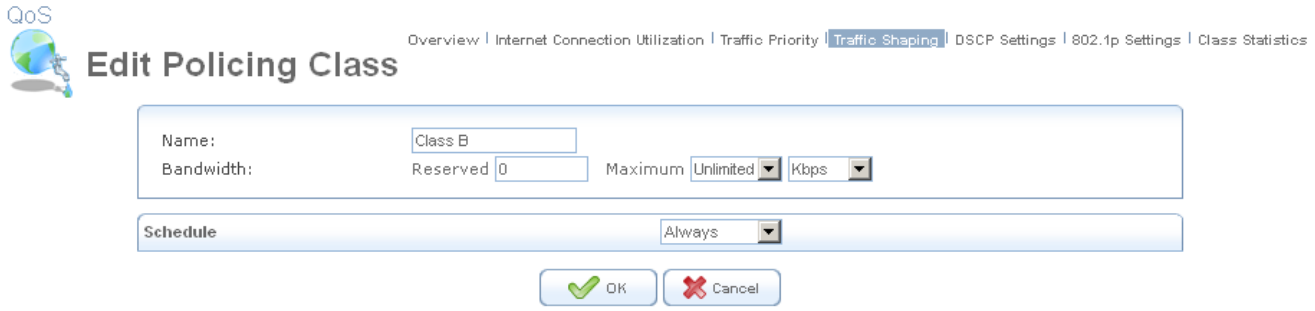


Figure 8-53: Edit Policing Class

Configure the following fields:

Name The name of the class.

Bandwidth The reserved reception bandwidth in kilo-bits per second. You can limit the maximum allowed bandwidth by selecting the 'Specify' option in the combo box. The screen refreshes, adding yet another Kbps field.

Figure 8-54: Specify Maximum Bandwidth

Schedule By default, the class will always be active. However, you can configure scheduler rules in order to define time segments during which the class may be active. To learn how to configure scheduler rules, refer to Section 9.9.3.

8.3.5 Differentiated Services Code Point Settings

In order to understand what is Differentiated Services Code Point (DSCP), one must first be familiarized with the Differentiated Services model. Differentiated Services (Diffserv) is a Class of Service (CoS) model that enhances best-effort Internet services by differentiating traffic by users, service requirements and other criteria.

Packets are specifically marked, allowing network nodes to provide different levels of service, as appropriate for voice calls, video playback or other delay-sensitive applications, via priority queuing or bandwidth allocation, or by choosing dedicated routes for specific traffic flows.

Diffserv defines a field in IP packet headers referred to as DSCP. Hosts or routers passing traffic to a Diffserv-enabled network will typically mark each transmitted packet with an appropriate DSCP. The DSCP markings are used by Diffserv network routers to appropriately classify packets and to apply particular queue handling or scheduling behavior. Watson provides a table of predefined DSCP values, which are mapped to 802.1p priority marking method (refer to Section 8.3.6).

You can edit or delete any of the existing DSCP setting, as well as add new entries.

1. Under the QoS menu item, click 'DSCP Settings'. The following screen appears.

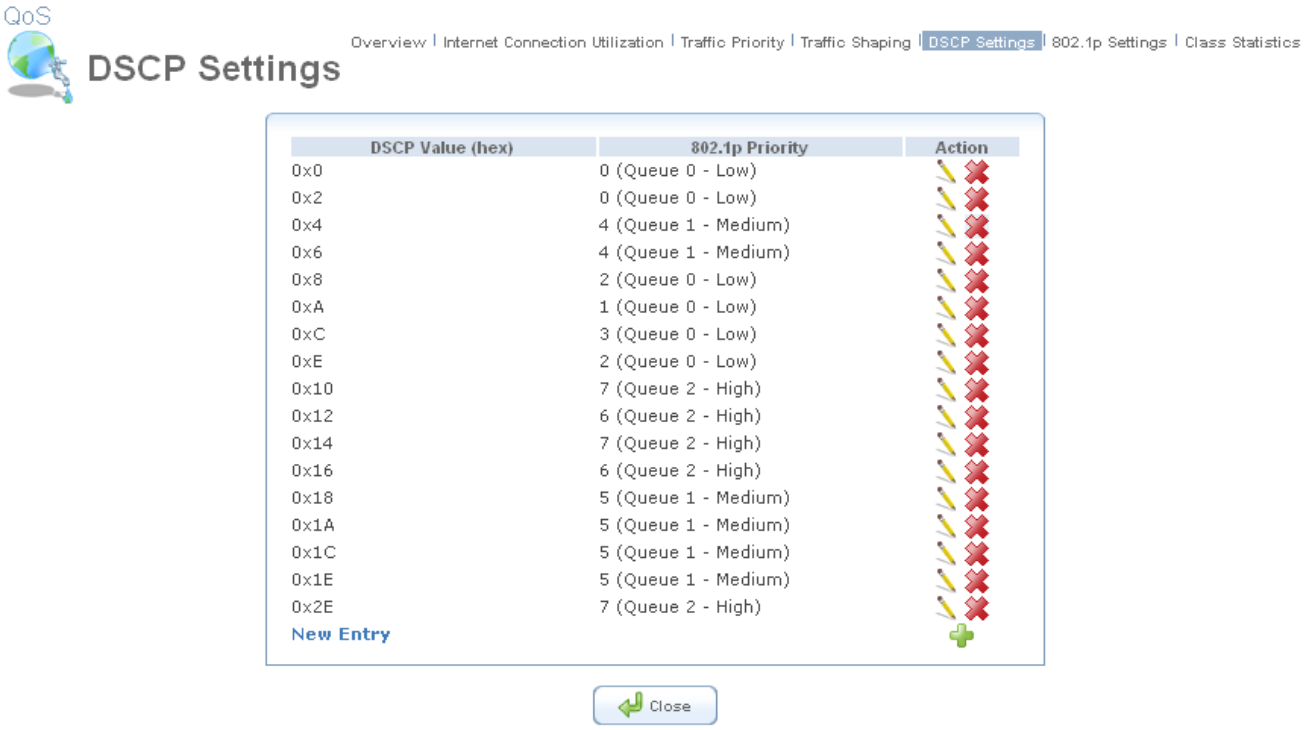

QoS
DSCP Settings
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
DSCP Value (hex)
802.1p Priority
Action
0x0 0 (Queue 0 - Low)
0x2 0 (Queue 0 - Low)
0x4 4 (Queue 1 - Medium)
0x6 4 (Queue 1 - Medium)
0x8 2 (Queue 0 - Low)
0xA 1 (Queue 0 - Low)
0xC 3 (Queue 0 - Low)
0xE 2 (Queue 0 - Low)
0x10 7 (Queue 2 - High)
0x12 6 (Queue 2 - High)
0x14 7 (Queue 2 - High)
0x16 6 (Queue 2 - High)
0x18 5 (Queue 1 - Medium)
0x1A 5 (Queue 1 - Medium)
0x1C 5 (Queue 1 - Medium)
0x1E 5 (Queue 1 - Medium)
0x2E 7 (Queue 2 - High)
New Entry
Close

Figure 8-55: DSCP–Traffic Priority Matching

Each DSCP value is assigned a default queue number as a part of its 802.1p priority settings. Watson's QoS supports up to eight Priorities which are mapped to low/medium/high priority queues, where Queue 0 has the lowest priority.

2. To edit an existing entry, click its action icon . To add a new entry, click the 'New Entry' link. In both cases, the 'Edit DSCP Settings' screen appears.

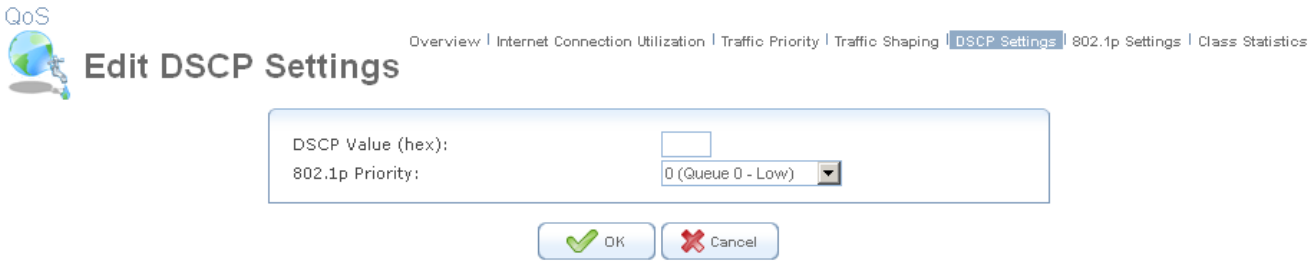

QoS
Edit DSCP Settings
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
DSCP Value (hex):
802.1p Priority:
0 (Queue 0 - Low)
OK
Cancel

Figure 8-56: Edit DSCP Settings

3. Configure the following fields:

- **DSCP Value (hex)** Enter a hexadecimal number that will serve as the DSCP value.
- **802.1p Priority** Select a 802.1p priority level from the drop-down menu (each priority level is mapped to low/medium/high priority queue).

4. Click 'OK' to save the settings.

Note that the DSCP value overriding the priority of incoming packets with an unassigned value (priority 0, assumed to be a no-priority-set) is "0x0".

8.3.6 802.1p Settings

The IEEE 802.1p priority marking method is a standard for prioritizing network traffic at the data link/Mac sub-layer. 802.1p traffic is simply classified and sent to the destination, with no bandwidth reservations established. The 802.1p header includes a 3-bit prioritization field, which allows packets to be grouped into eight levels of priority (0-7), where level 7 is the highest one. In addition, Watson maps these eight levels to low/medium/high priority queues, where Queue 0 has the lowest priority.

By default, the higher the level and queue values, the more priority they receive. Therefore, the more critical the traffic is, the higher priority level and queue number it should receive. To change the mapping between a priority value and a queue value, perform the following:

1. Under the 'QoS' menu item, click '802.1p Settings'. The following screen appears.

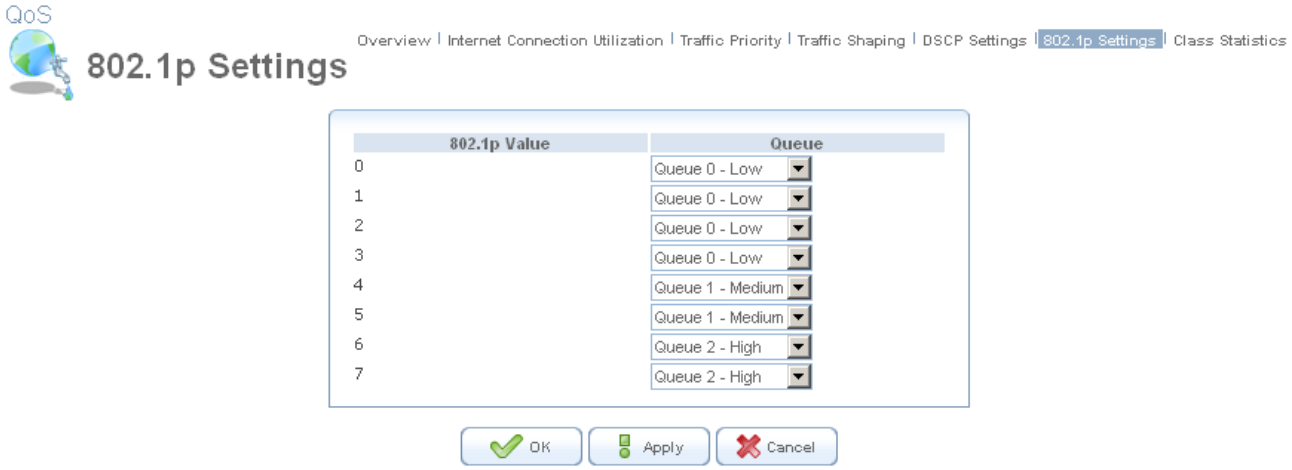

QoS
802.1p Settings
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
802.1p Value
Queue
0 Queue 0 - Low
1 Queue 0 - Low
2 Queue 0 - Low
3 Queue 0 - Low
4 Queue 1 - Medium
5 Queue 1 - Medium
6 Queue 2 - High
7 Queue 2 - High
OK
Apply
Cancel

Figure 8-57: Traffic Queuing in 802.1p Settings

2. From the corresponding drop-down menu, select a desired value.

3. Click 'OK' to save the settings.

8.3.7 Class Statistics

Watson provides you with accurate, real-time information on the traffic moving through your defined device classes. For example, the amount of packets sent, dropped or delayed, are just a few of the parameters that you can monitor per each shaping class. To view your class statistics, click 'Class Statistics' under the QoS menu item. The following screen appears.

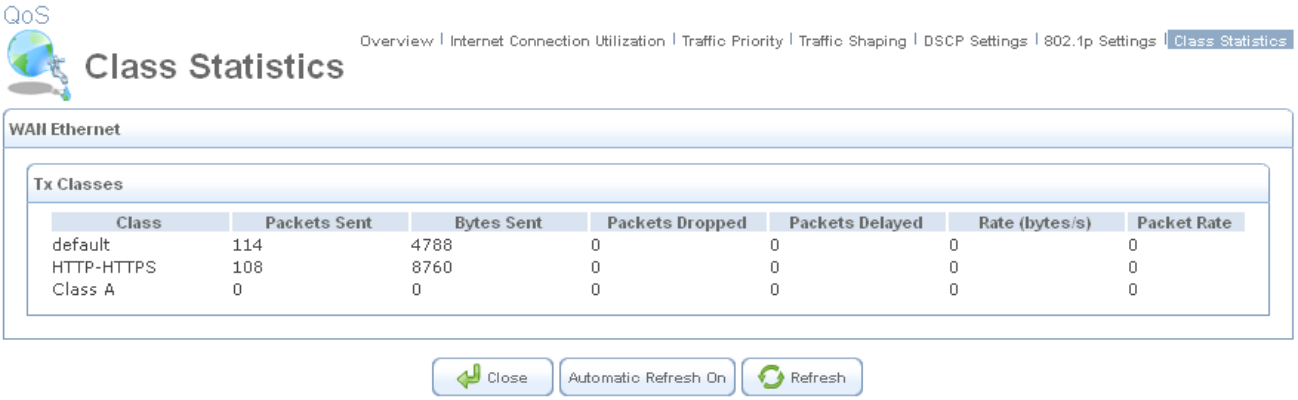

QoS
Class Statistics
Overview | Internet Connection Utilization | Traffic Priority | Traffic Shaping | DSCP Settings | 802.1p Settings | Class Statistics
WAN Ethernet
Tx Classes
Class | Packets Sent | Bytes Sent | Packets Dropped | Packets Delayed | Rate (bytes/s) | Packet Rate
default | 114 | 4788 | 0 | 0 | 0 | 0
HTTP-HTTPS | 108 | 8760 | 0 | 0 | 0 | 0
Class A | 0 | 0 | 0 | 0 | 0 | 0
Close
Automatic Refresh On
Refresh

Figure 8-58: Class Statistics

Note that class statistics will only be available after defining at least one class (otherwise the screen will not present any information).

8.4 Virtual Private Network

8.4.1 Internet Protocol Security

Internet Protocol Security (IPSec) is a series of guidelines for the protection of Internet Protocol (IP) communications. It specifies procedures for securing private information transmitted over public networks. The IPSec protocols include:

- AH (Authentication Header) provides packet-level authentication.
- ESP (Encapsulating Security Payload) provides encryption and authentication.
- IKE (Internet Key Exchange) negotiates connection parameters, including keys, for the other two services.

Services supported by the IPSec protocols (AH, ESP) include confidentiality (encryption), authenticity (proof of sender), integrity (detection of data tampering), and replay protection (defense against unauthorized resending of data). IPSec also specifies methodologies for key management. Internet Key Exchange (IKE), the IPSec key management protocol, defines a series of steps to establish keys for encrypting and decrypting information; it defines a common language on which communications between two parties is based. Developed by the Internet Engineering Task Force (IETF), IPSec and IKE together standardize the way data protection is performed, thus making it possible for security systems developed by different vendors to interoperate.

8.4.1.1 Technical Specifications

- Security architecture for the Internet Protocol
- IP Security Document Roadmap

- Connection type: Tunnel, Transport
- Use of Internet Security Association and Key Management Protocol (ISAKMP) in main and aggressive modes
- Key management: Manual, Automatic (Internet Key Exchange)
- NAT Traversal Negotiation for resolution of NATed tunnel endpoint scenarios
- Dead Peer Detection for tunnel disconnection in case the remote endpoint ceases to operate
- Gateway authentication: X.509, RSA signatures and pre-shared secret key
- IP protocols: ESP, AH
- Encryption: AES, 3DES, DES, NULL, HW encryption integration
- Authentication: MD5, SHA-1
- IP Payload compression
- Interoperability: VPNC Certified IPSec, Windows 2000, Windows NT, FreeS/WAN, FreeBSD, Checkpoint Firewall-1, Safenet SoftRemote, Net-Screen, SSH Sentinel

8.4.1.2 IPSec Settings

Access this feature either from the 'VPN' menu item under the 'Services' tab, or by clicking the IPSec icon in the 'Advanced' screen. The 'Internet Protocol Security (IPSec)' screen appears.

Figure 8-59: Internet Protocol Security (IPSec)

This screen enables you to configure:

Block Unauthorized IP Select the Enabled check-box to block unauthorized IP packets to Watson. Specify the following parameters:

Maximum Number of Authentication Failures The maximum number of packets to authenticate before blocking the origin's IP address.

Block Period (in seconds) The timeframe in which packets from an unauthorized IP address will be dropped.

Anti-Replay Protection Select this option to enable dropping of packets that are recognized (by their sequence number) as already been received.

Connections This section will display the list of IPSec connections. To learn how to create an IPSec connection, refer to Section 9.4.14.

8.4.1.2.1 Public Key Management

The 'Settings' button in the 'Internet Protocol Security (IPSec)' screen enables you to manage Watson's public keys.

1. Press the 'Settings' button to view Watson's public key. If necessary, you can copy the public key from the screen that appears.

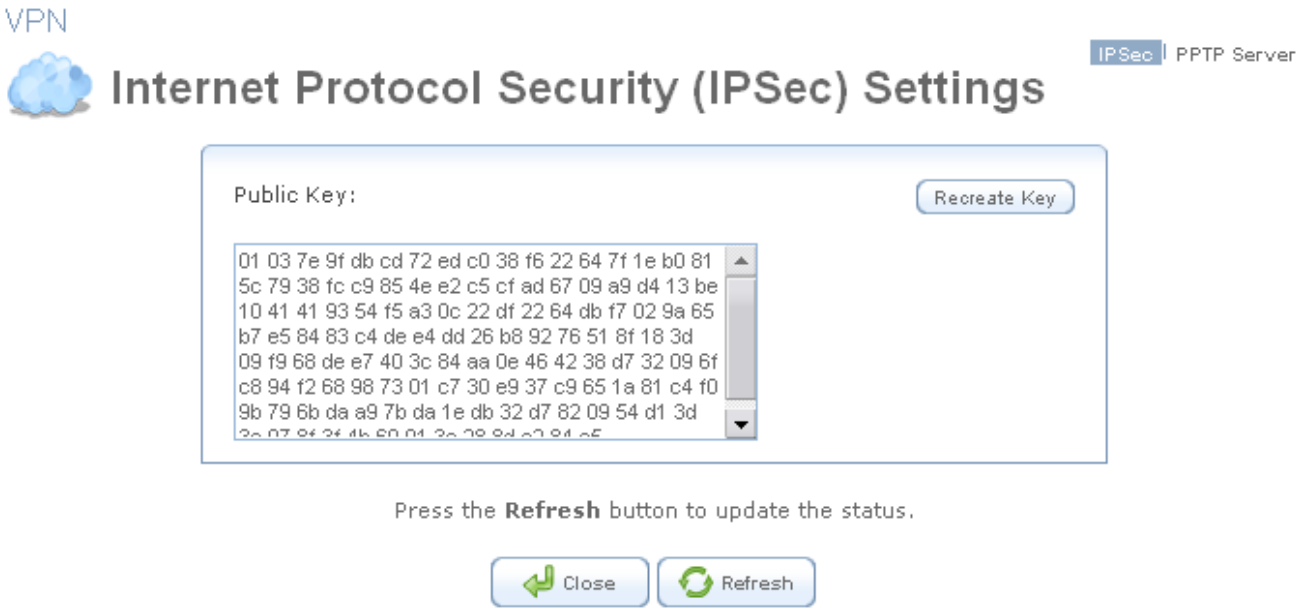

VPN
IPSec
PPTP Server
Internet Protocol Security (IPSec) Settings
Public Key:
Recreate Key
01 03 7e 9f db cd 72 ed c0 38 f6 22 64 7f 1e b0 81
5c 79 38 fc c9 85 4e e2 c5 cf ad 67 09 a9 d4 13 be
10 41 41 93 54 f5 a3 0c 22 df 22 64 db f7 02 9a 65
b7 e5 84 83 c4 de e4 dd 26 b8 92 76 51 8f 18 3d
09 f9 68 de e7 40 3c 84 aa 0e 46 42 38 d7 32 09 6f
c8 94 f2 68 98 73 01 c7 30 e9 37 c9 65 1a 81 c4 f0
9b 79 6b da a9 7b da 1e db 32 d7 82 09 54 d1 3d
Press the Refresh button to update the status.
Close
Refresh

Figure 8-60: Internet Protocol Security (IPSec) Settings

2. Press the 'Recreate Key' button to recreate the pubic key, or the 'Refresh' button to refresh the key displayed in this screen.

8.4.1.2.2 Log Settings

The IPSec Log can be used to identify and analyze the history of the IPSec package commands, attempts to create connections, etc. IPSec activity, as well as that of other Watson modules, is displayed together in this view.

1. Press the 'Log Settings' button. The 'IPSec Log Settings' screen appears (see Figure 8-61).
2. Select the check boxes relevant to the information you would like the IPSec log to record.

3. Click 'OK' to save the settings.

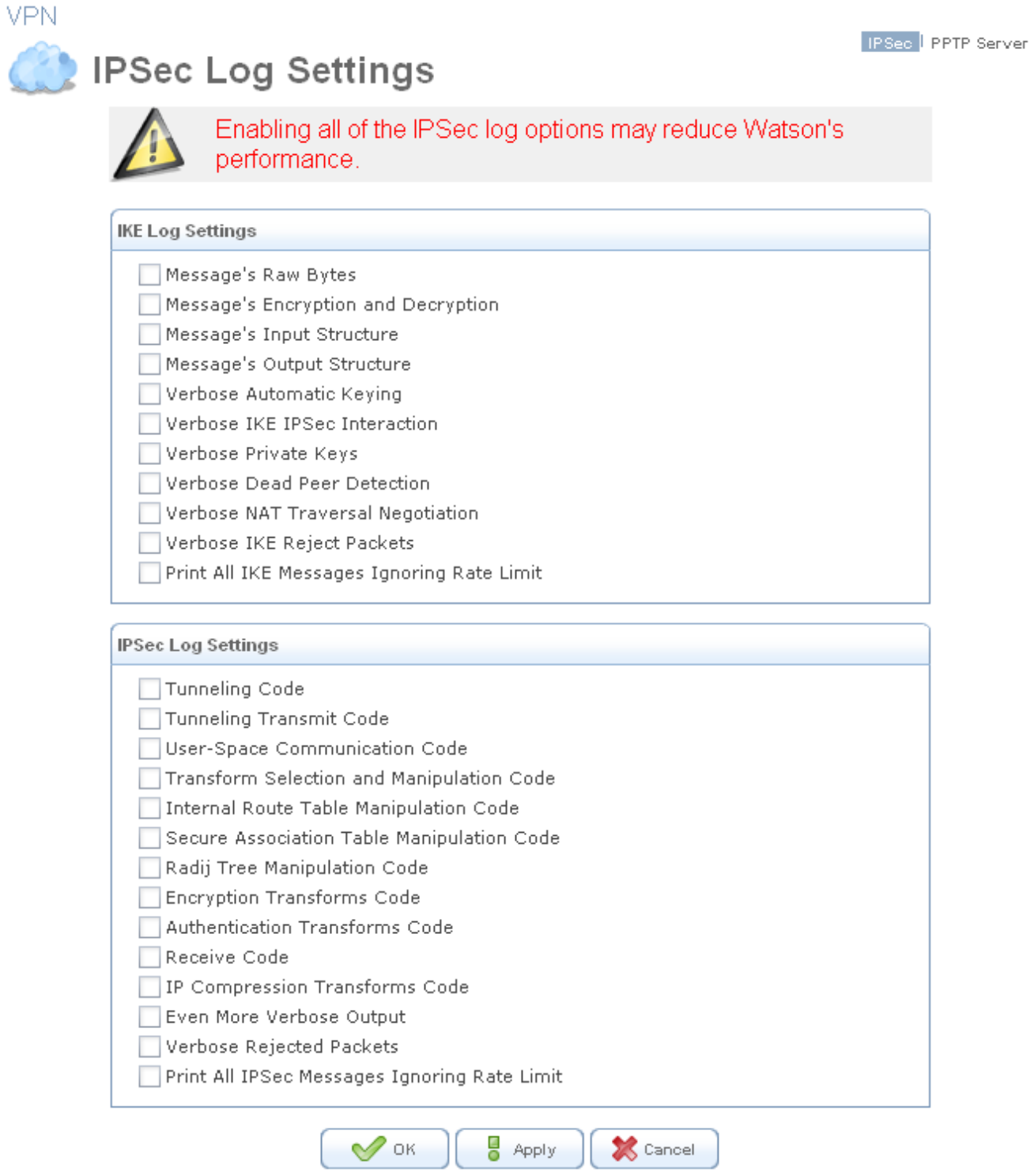


Figure 8-61: IPSec Log Settings

8.4.1.3 IPSec Connection Settings

The IPSec connections are displayed under the 'Connections' section of the 'Internet Protocol Security (IPSec)' screen (see Figure 8-59), in addition to the general

'Network Connections' screen (refer to Section 9.4). To configure an IPSec connection settings, perform the following:

1. Press the connection's action icon . The 'VPN IPSec Properties' screen appears, displaying the 'General' sub-tab.

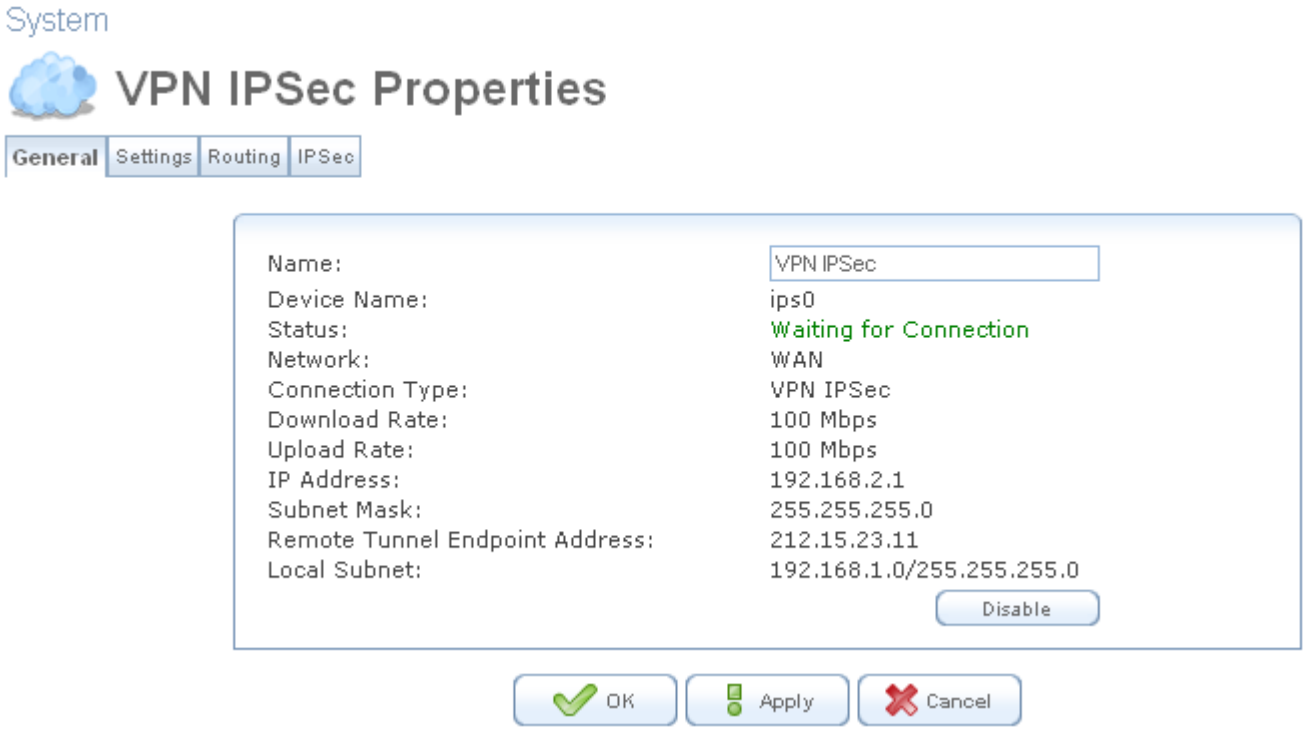


Figure 8-62: VPN IPSec Properties – General

2. Press the 'Settings' sub-tab, and configure the following settings.

Figure 8-63: VPN IPSec Properties – Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu

will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

3. Press the 'Routing' sub-tab, and define the connection's routing rules. To learn how to create routing rules, refer to Section 9.6.1.

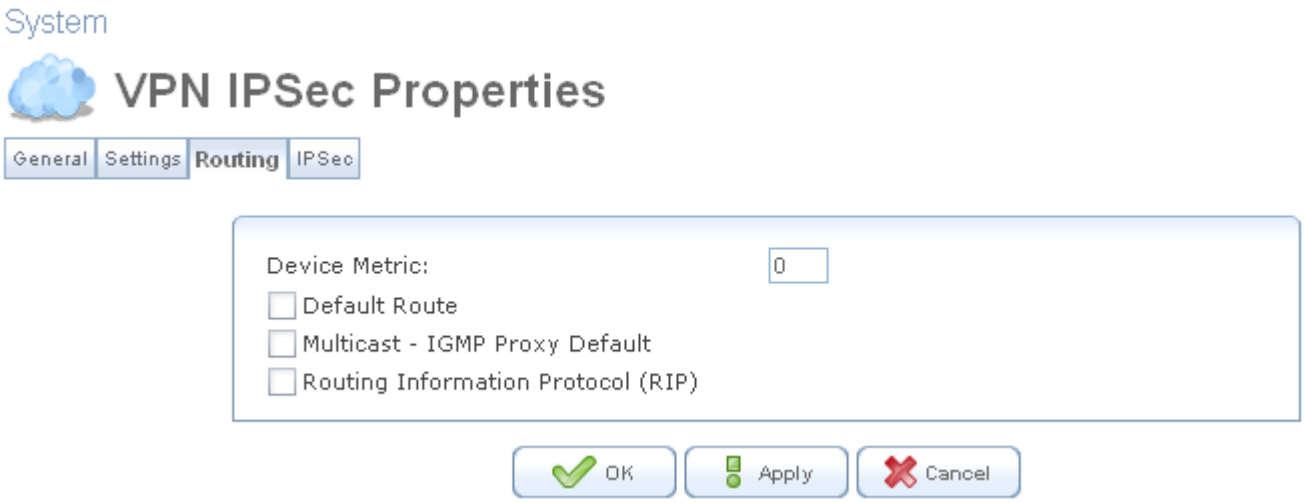


Figure 8-64: VPN IPSec Properties – Routing

4. Press the 'IPSec' sub-tab, and configure the following settings.

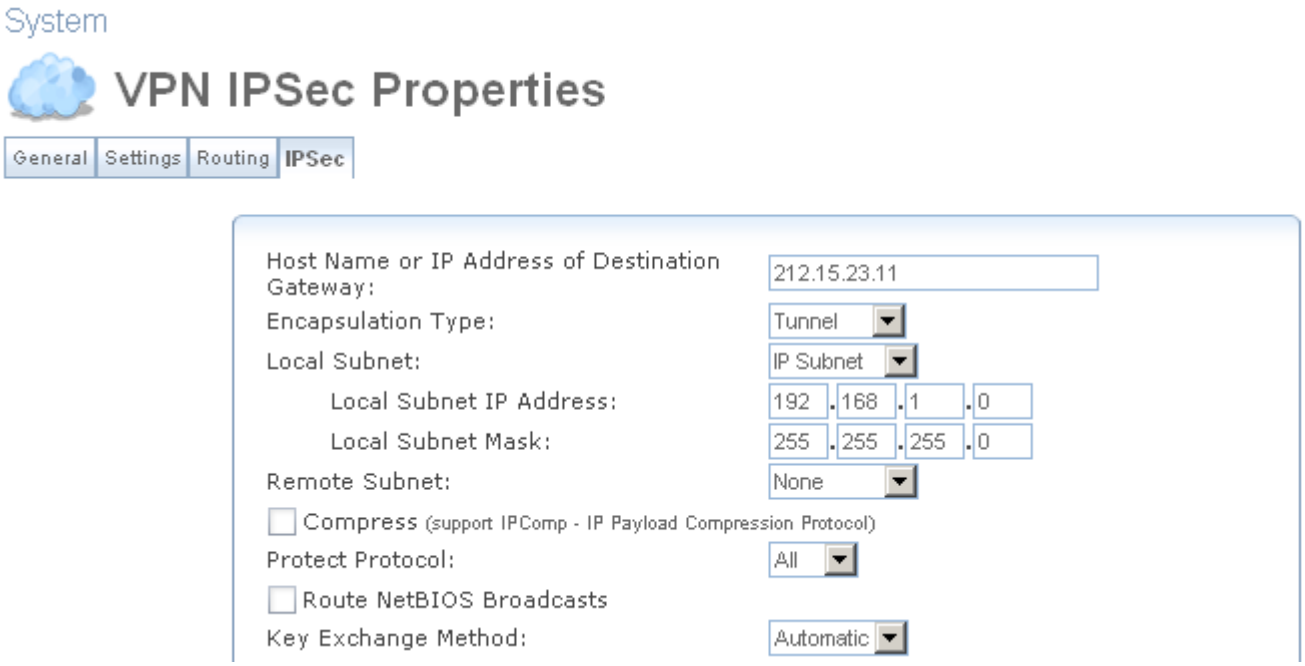


Figure 8-65: VPN IPSec Properties – IPSec

Host Name or IP Address of Destination Gateway The IP address of your IPSec peer. If your connection is an IPSec Server, this field will display "Any Remote Gateway".

Encapsulation Type Select between 'Tunneling' or 'Transport' encapsulation. 'Transport' encapsulation is performed between two gateways (no subnets), and therefore needs no explicit configuration. 'Tunneling' requires that you configure the following parameters:

Local Subnet Define your local endpoint, by selecting one of the following options:

- IP Subnet (default) – enter Watson's Local Subnet IP Address and Local Subnet Mask.
- IP Range – enter the 'From' and 'To' IP addresses, forming the endpoints range of the local subnet(s).
- IP Address – enter the Local IP Address to define the endpoint as a single host.
- None – select this option if you do not want to define a local endpoint. The endpoint will be set to the gateway.

Remote Subnet This section is identical to the 'Local Subnet' section above, but is for defining the remote endpoint.

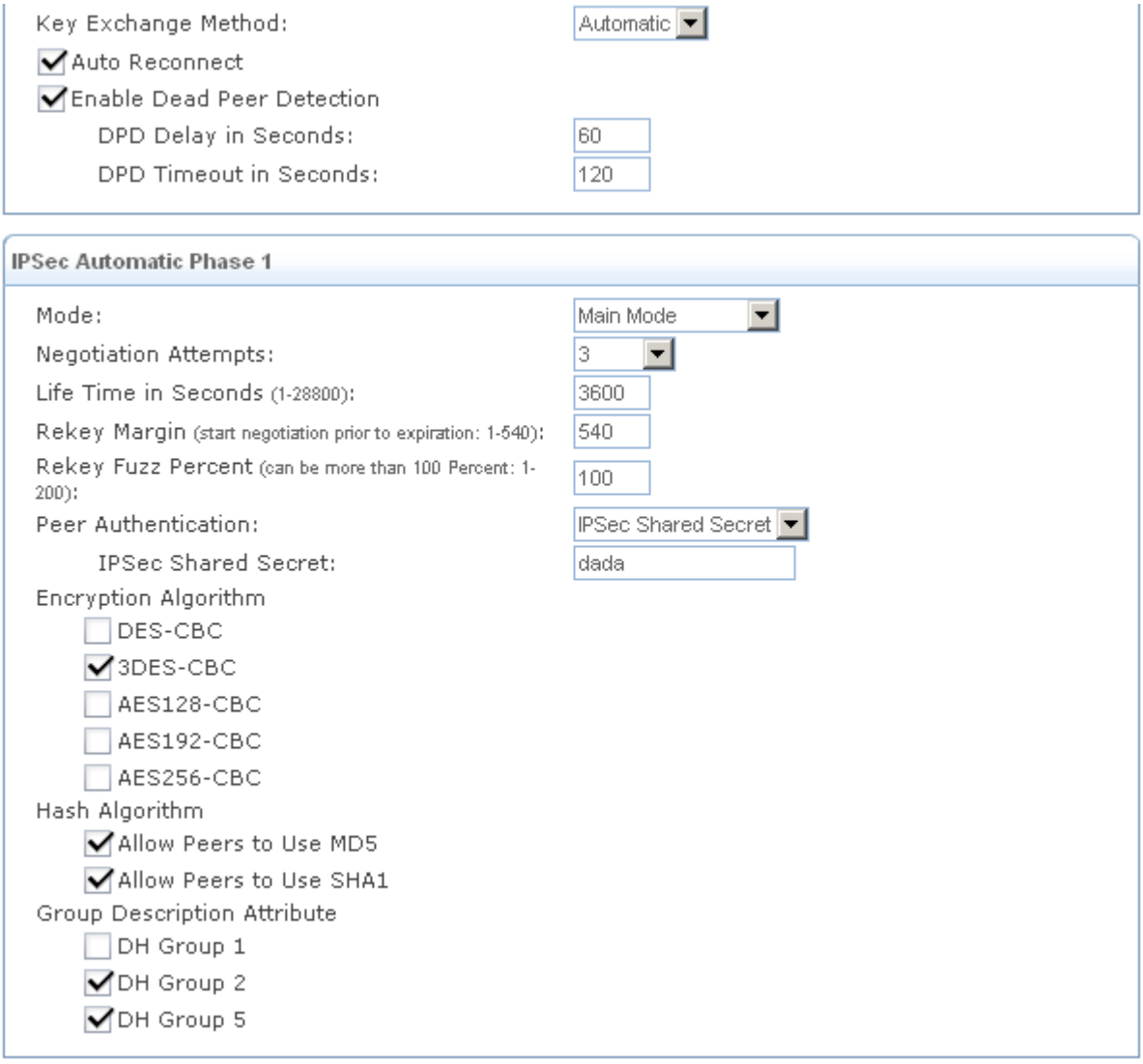
Compress (Support IPComp) Select this check-box to compress packets during encapsulation with the IP Payload Compression protocol. Please note that this reduces performance (and is therefore unchecked by default).

Protect Protocol Select the protocols to protect with IPSec: All, TCP, UDP, ICMP or GRE. When selecting TCP or UDP, additional source port and destination port combo-boxes will appear, enabling you to select 'All' or to specify 'Single' ports in order to define the protection of specific packets. For example, in order to protect L2TP packets, select UDP and specify 1701 as both single source and single destination ports.

Route NetBIOS Broadcasts Select this option to allow NetBIOS packets through the IPSec tunnel, which otherwise would not meet the routing conditions specified.

Key Exchange Method The IPSec key exchange method can be 'Automatic' (the default) or 'Manual'. Selecting one of these options will alter the rest of the screen.

1. ‘Automatic’ key exchange settings:



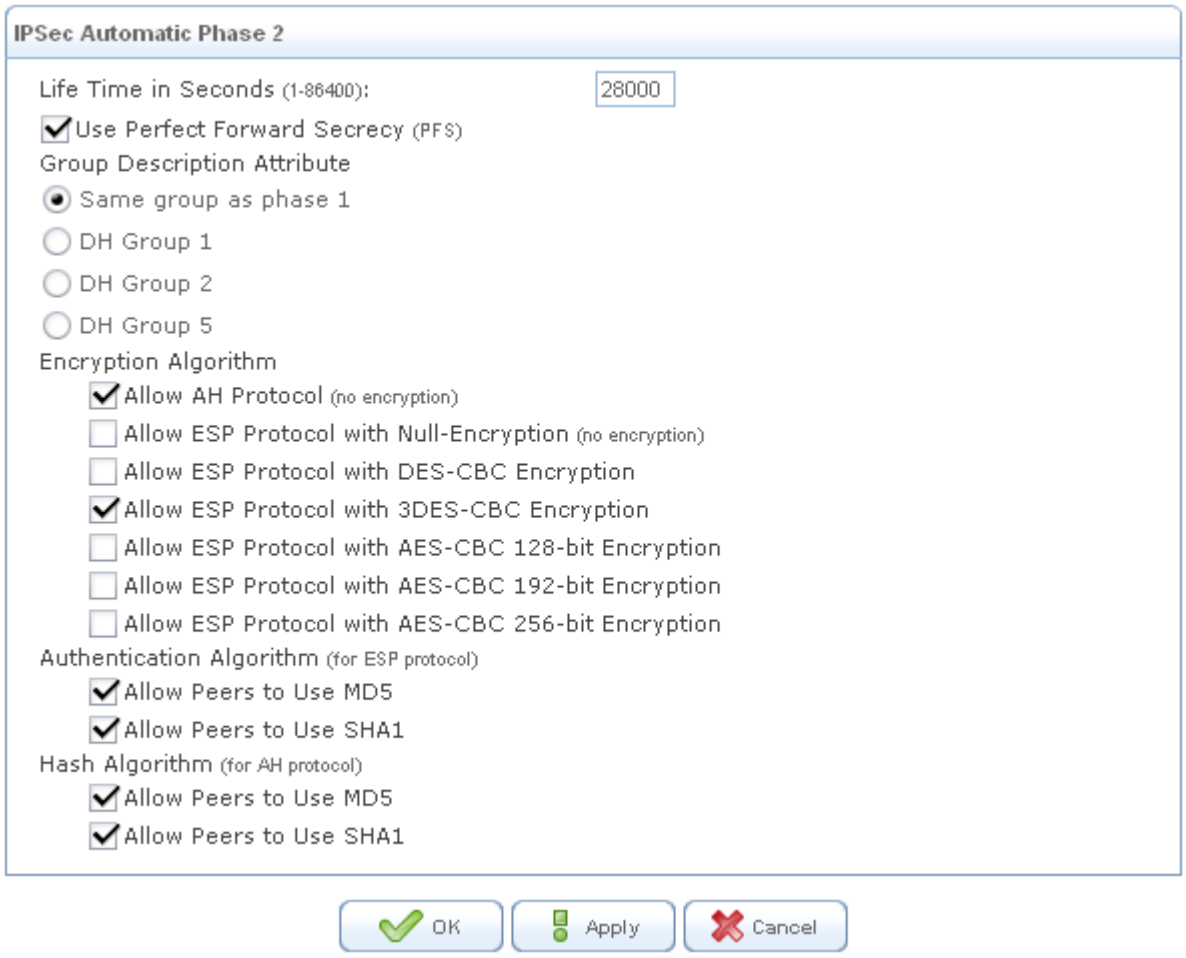

IPSec Automatic Phase 2
Life Time in Seconds (1-86400):
28000
Use Perfect Forward Secrecy (PFS)
Group Description Attribute
Same group as phase 1
DH Group 1
DH Group 2
DH Group 5
Encryption Algorithm
Allow AH Protocol (no encryption)
Allow ESP Protocol with Null-Encryption (no encryption)
Allow ESP Protocol with DES-CBC Encryption
Allow ESP Protocol with 3DES-CBC Encryption
Allow ESP Protocol with AES-CBC 128-bit Encryption
Allow ESP Protocol with AES-CBC 192-bit Encryption
Allow ESP Protocol with AES-CBC 256-bit Encryption
Authentication Algorithm (for ESP protocol)
Allow Peers to Use MD5
Allow Peers to Use SHA1
Hash Algorithm (for AH protocol)
Allow Peers to Use MD5
Allow Peers to Use SHA1
OK
Apply
Cancel

Figure 8-66: Automatic Key Exchange Settings

Auto Reconnect The IPSec connection will reconnect automatically if disconnected for any reason.

Enable Dead Peer Detection Watson will detect whether the tunnel endpoint has ceased to operate, in which case will terminate the connection. Note that this feature will be functional only if the other tunnel endpoint supports it. This is determined during the negotiation phase of the two endpoints.

DPD Delay in Seconds The timeframe in which no traffic has passed through the tunnel. After this timeframe, Watson will send a packet to test the tunnel endpoint, expecting a reply.

DPD Timeout in Seconds The timeframe Watson will wait for the test reply, after which it will terminate the connection.

- IPSec Automatic Phase 1 – Peer Authentication

Mode Select the IPSec mode – either 'Main Mode' or 'Aggressive Mode'. Main mode is a secured but slower mode, which presents negotiable propositions according to the authentication algorithms that you select in the check-boxes. Aggressive Mode is faster but less secured. When selecting this mode, the algorithm

check-boxes are replaced by radio buttons, presenting strict propositions according to your selections.

Negotiation attempts Select the number of negotiation attempts to be performed in the automatic key exchange method. If all attempts fail, Watson will wait for a negotiation request.

Life Time in Seconds The timeframe in which the peer authentication will be valid.

Rekey Margin Specifies how long before connection expiry should attempts to negotiate a replacement begin. It is similar to that of the key life time and is given as an integer denoting seconds.

Rekey Fuzz Percent Specifies the maximum percentage by which Rekey Margin should be randomly increased to randomize re-keying intervals.

Peer Authentication Select the method by which Watson will authenticate your IPSec peer:

- IPSec Shared secret – enter the IPSec shared secret.
- RSA Signature – enter the peer's RSA signature (equivalent to Watson's public key – refer to Section 8.4.1.2.1).
- Certificate – if a certificate exists on Watson, it will appear when you select this option. Enter the certificate's local ID and peer ID. To learn how to add certificates to Watson, please refer to Section 9.9.4.

Encryption Algorithm Select the encryption algorithms that Watson will attempt to use when negotiating with the IPSec peer.

Hash Algorithm Select the hash algorithms that Watson will attempt to use when negotiating with the IPSec peer.

Group Description Attribute Select the Diffie-Hellman (DH) group description(s). Diffie-Hellman is a public-key cryptography scheme that allows two parties to establish a shared secret over an insecure communications channel.

- IPSec Automatic Phase 2 – Key Definition

Life Time in Seconds The length of time before a security association automatically performs renegotiation.

Use Perfect Forward Secrecy (PFS) Select whether Perfect Forward Secrecy of keys is required on the connection's keying channel (with PFS, penetration of the key-exchange protocol does not compromise keys negotiated earlier). Deselecting this option will hide the next parameter.

Group Description Attribute Select whether to use the same group chosen in phase 1, or reselect specific groups.

Encryption Algorithm Select the encryption algorithms that Watson will attempt to use when negotiating with the IPSec peer.

Authentication Algorithm (for ESP protocol) Select the authentication algorithms that Watson will attempt to use when negotiating with the IPSec peer.

Hash Algorithm (for AH protocol) Select the hash algorithms that Watson will attempt to use when negotiating with the IPSec peer.

2. ‘Manua’l key definition:

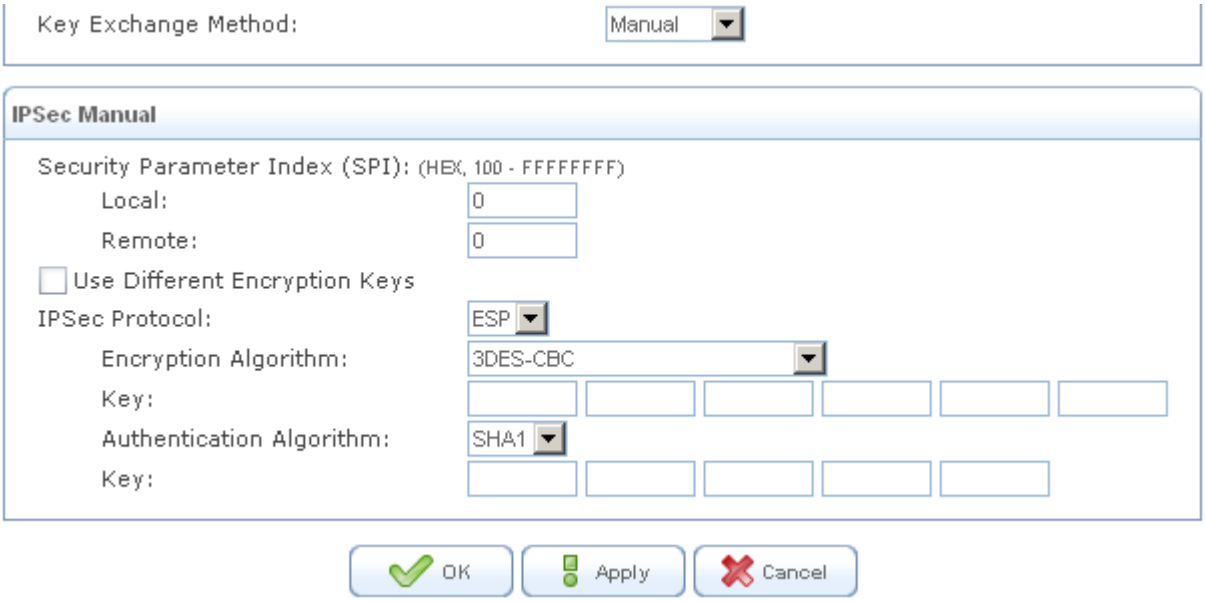


Figure 8-67: Manual Key Definition

Security Parameter Index (SPI): (HEX, 100 - FFFFFFFF) A 32 bit value that together with an IP address and a security protocol, uniquely identifies a particular security association. The local and remote values must be coordinated with their respective values on the IPSec peer.

Use Different Encryption Keys Selecting this option allows you to define both local and remote algorithm keys when defining the IPSec protocol (in the next section).

IPSec Protocol Select between the ESP and AH IPSec protocols. The screen will refresh accordingly:

- ESP – Select the encryption and authentication algorithms, and enter the algorithm keys in hexadecimal representation.
- AH – Select the hash algorithm, and enter the algorithm key in hexadecimal representation.

Click 'OK' to save the settings.

8.4.1.4 IPSec Gateway-to-Host Connection Scenario

In order to create an IPSec connection between Watson and a Windows host, you need to configure both the gateway and the host. This section describes both Watson's configuration and a Windows XP client configuration.

8.4.1.4.1 Configuring IPSec on Watson

1. Under the 'System' tab, click the 'Network Connections' menu item. The 'Network Connections' screen appears.

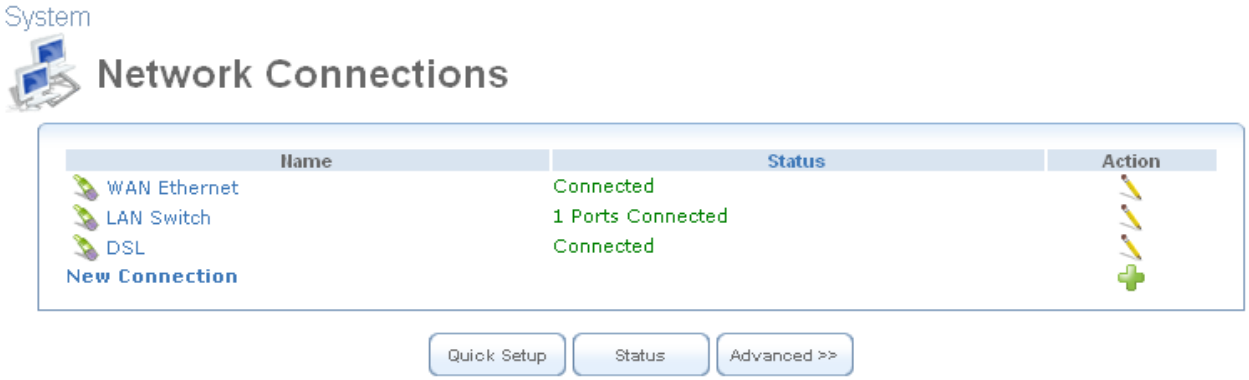


Figure 8-68: Network Connections

2. Click the 'New Connection' link. The 'Connection Wizard' screen appears.

System
Connection Wizard
Choose the type of network connection you want to create, based on your network configuration and your networking needs.
Internet Connection
Connect to the Internet using your DSL connection so you can browse the Web and read email.
Connect to a Virtual Private Network over the Internet
Connect Watson to a business network using a Virtual Private Network (VPN) so you can work from home, workplace or another location.
Advanced Connection
Manually configure a new connection.
Next
Cancel

Figure 8-69: Connection Wizard

3. Select the 'Connect to a Virtual Private Network over the Internet' radio button and click 'Next'. The 'Connect to a Virtual Private Network over the Internet' screen appears.

System
Connect to a Virtual Private Network over the Internet
Choose your VPN connection type:
VPN Client or Point-To-Point
Connect to your business network from home or another location, using a Virtual Private Network (VPN) over the Internet.
VPN Server
Enable Virtual Private Network (VPN) connections to Watson from other locations.
Back
Next
Cancel

Figure 8-70: Connect to a Virtual Private Network over the Internet

4. Select the 'VPN Client or Point-To-Point' radio button and click 'Next'. The 'VPN Client or Point-To-Point' screen appears.

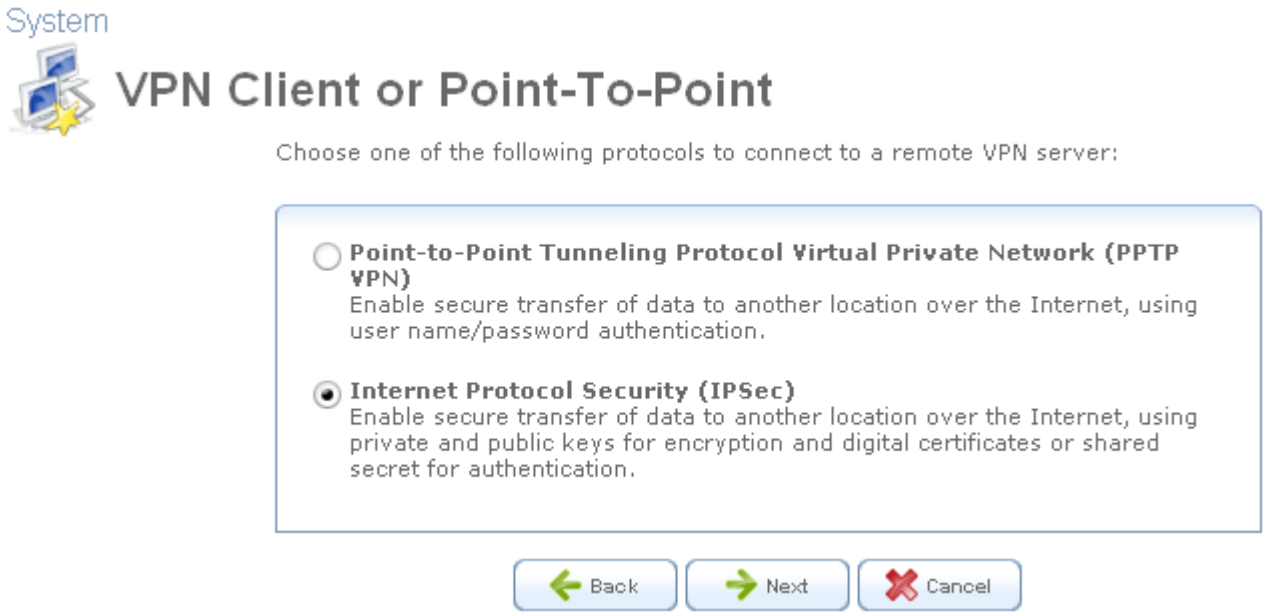

System
VPN Client or Point-To-Point
Choose one of the following protocols to connect to a remote VPN server:
Point-to-Point Tunneling Protocol Virtual Private Network (PPTP VPN)
Enable secure transfer of data to another location over the Internet, using user name/password authentication.
Internet Protocol Security (IPSec)
Enable secure transfer of data to another location over the Internet, using private and public keys for encryption and digital certificates or shared secret for authentication.
Back
Next
Cancel

Figure 8-71: VPN Client or Point-To-Point

5. Select the 'Internet Protocol Security (IPSec)' radio button and click 'Next'. The 'Internet Protocol Security (IPSec)' screen appears.

Figure 8-72: Internet Protocol Security (IPSec)

6. Specify the following parameters:

Host Name or IP Address of Destination Gateway Specify 22.23.24.25

Remote IP Select "Same as Gateway".

Encapsulation Type Select "Tunnel".

Shared Secret Enter "hr5x".

7. Click 'Next'. The 'Connection Summary' screen appears.

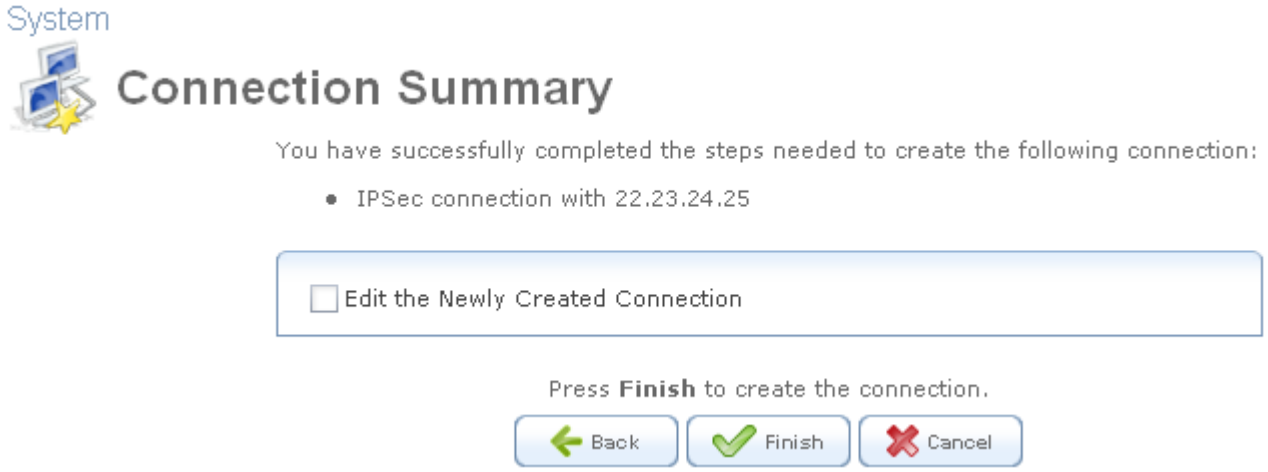


Figure 8-73: Connection Summary

8. Click 'Finish'. The 'Network Connections' screen displays the newly created IP-Sec connection.

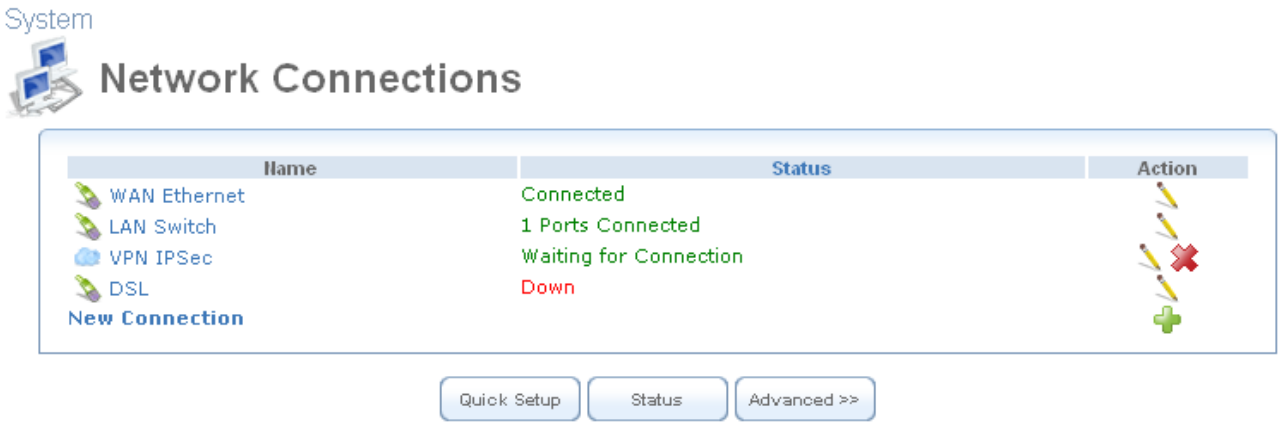


Figure 8-74: New VPN IPSec Connection

8.4.1.4.2 Configuring IPSec on the Windows Host

The following IP addresses are needed for the host configuration:

- Windows IP address – referred to as <windows_ip>.
- Watson WAN IP address – referred to as <Watson_wan_ip>.
- Watson LAN Subnet address – referred to as <Watson_lan_subnet>.

The configuration sequence:

1. Creating the IPSec Policy:

   a. Click the Start button and select Run. Type "secpol.msc" and click 'OK'. The 'Local Security Settings' window appears.

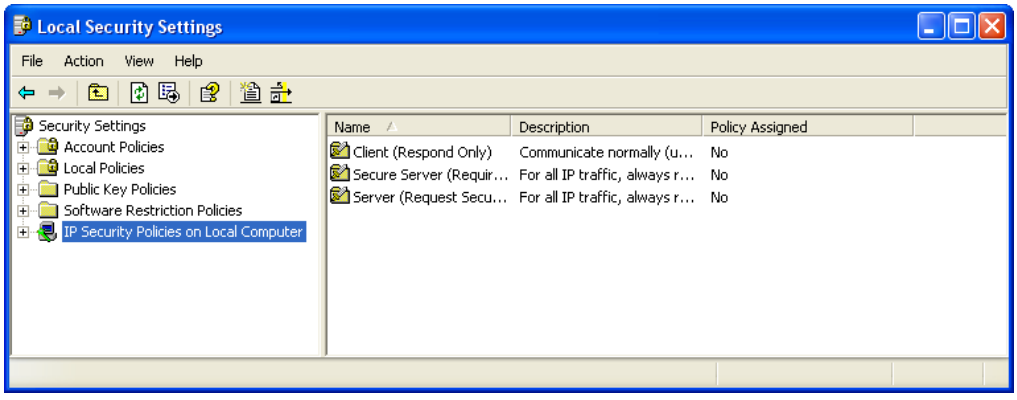


Figure 8-75: Local Security Settings

b. Right-click the 'IP Security Policies on Local Computer' and choose 'Create IP Security Policy...'. The IP Security Policy Wizard appears.

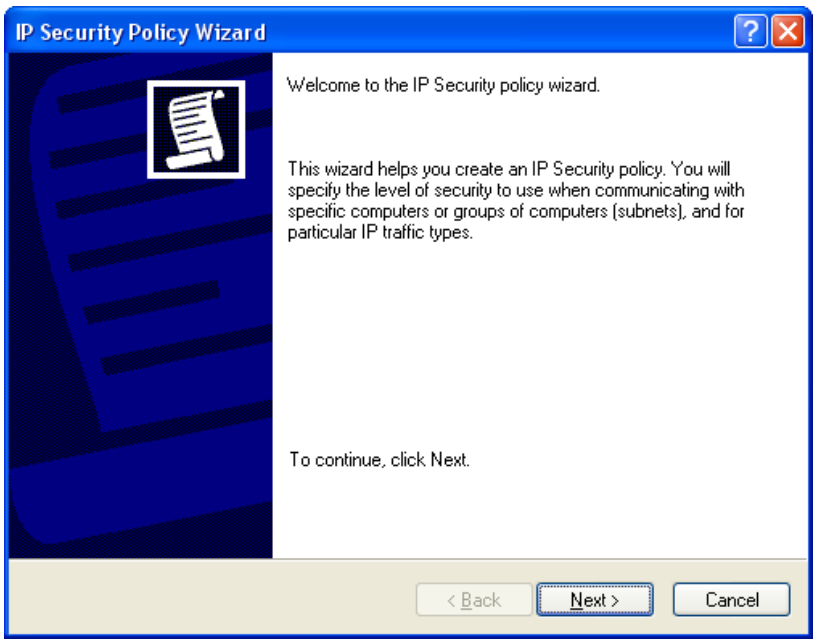

IP Security Policy Wizard
Welcome to the IP Security policy wizard.
This wizard helps you create an IP Security policy. You will specify the level of security to use when communicating with specific computers or groups of computers (subnets), and for particular IP traffic types.
To continue, click Next.
< Back
Next >
Cancel

Figure 8-76: IP Security Policy Wizard

c. Click 'Next' and type a name for your policy, for example "Watson Connection".

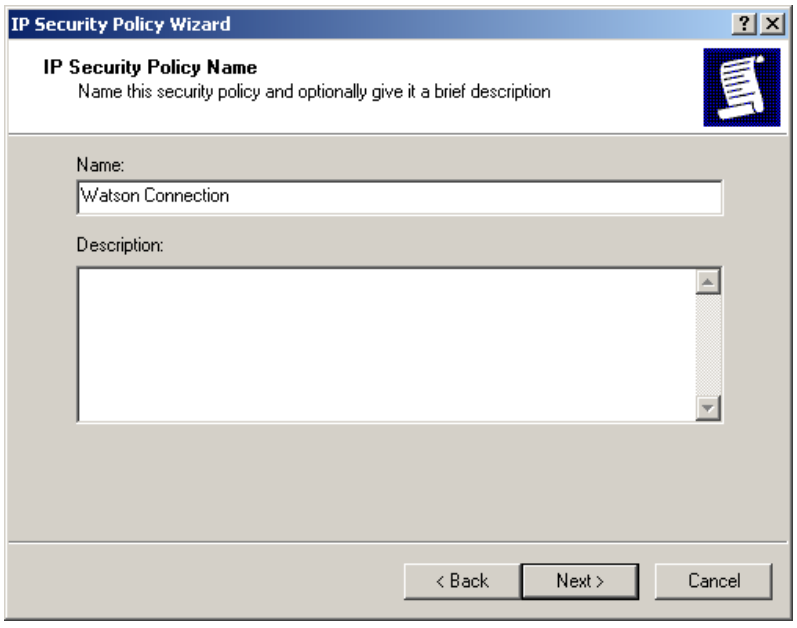


Figure 8-77: IP Security Policy Name

d. Click 'Next'. The 'Requests for Secure Communication' screen appears.

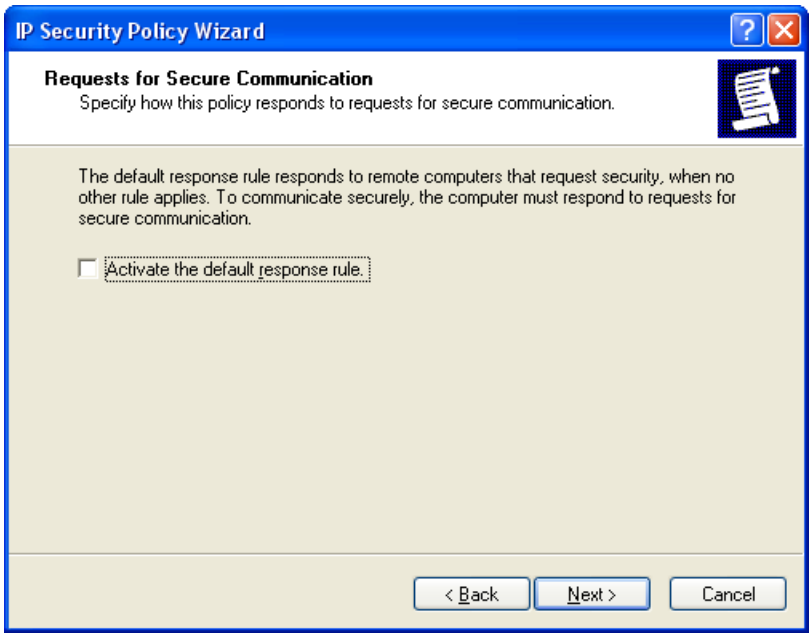

IP Security Policy Wizard
Requests for Secure Communication
Specify how this policy responds to requests for secure communication.
The default response rule responds to remote computers that request security, when no other rule applies. To communicate securely, the computer must respond to requests for secure communication.
Activate the default response rule.
< Back
Next >
Cancel

Figure 8-78: Requests for Secure Communication

e. Deselect the 'Activate the default response rule' check box, and click 'Next'. The 'Completing the IP Security Policy Wizard' screen appears.

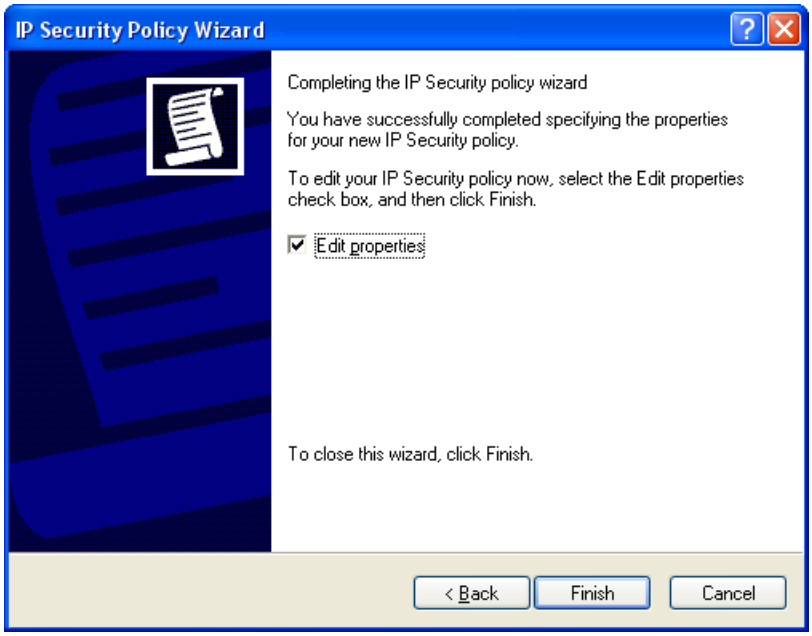

IP Security Policy Wizard
Completing the IP Security policy wizard
You have successfully completed specifying the properties for your new IP Security policy.
To edit your IP Security policy now, select the Edit properties check box, and then click Finish.
Edit properties
To close this wizard, click Finish.
< Back
Finish
Cancel

Figure 8-79: Completing the IP Security Policy Wizard

f. Make sure that the 'Edit Properties' check box is selected, and click 'Finish'. The 'Watson Connection Properties' window appears.

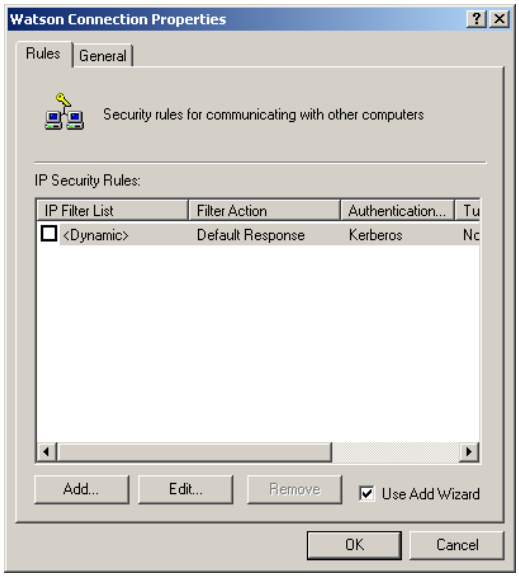


Figure 8-80: Watson Connection Properties

g. Click 'OK'.

2. Building Filter List 1 – Windows XP to Watson:

a. In the 'Local Security Settings' window, right-click the new 'Watson Connection' policy, created in the previous step, and select Properties. The Properties window appears (see Figure 8-81).

b. Deselect the 'Use Add Wizard' check box and click the 'Add' button to create a new IP Security rule. The 'New Rule Properties' window appears.

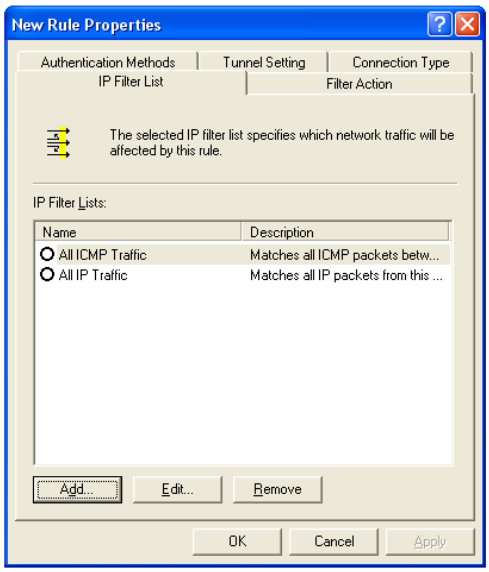


Figure 8-81: New Rule Properties

c. Under the IP Filter List tab, click the 'Add' button. The 'IP Filter List' window appears.

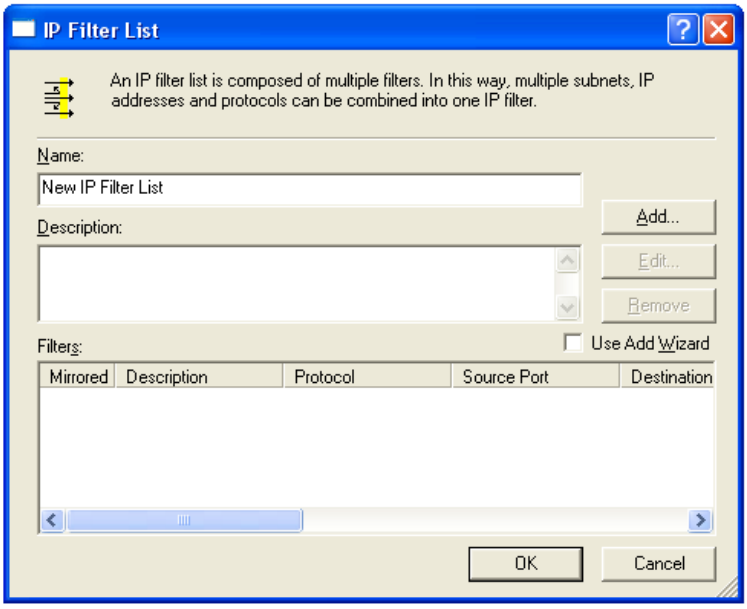


Figure 8-82: IP Filter List

d. Enter the name "Windows XP to Watson" for the filter list, and deselect the 'Use Add Wizard' check box. Then, click the 'Add' button. The 'Filter Properties' window appears.

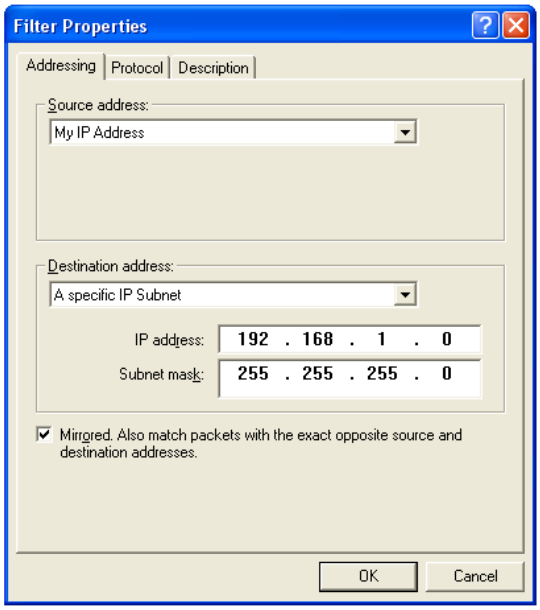


Figure 8-83: Filter Properties

e. In the 'Source address' drop-down menu, select 'My IP Address'.

f. In the 'Destination address' drop-down menu, select 'A Specific IP Subnet'. In the 'IP Address' field, enter the LAN Subnet (<Watson_lan_subnet>), and in the 'Subnet mask' field enter 255.255.255.0.

g. Click the 'Description' tab if you would like to enter a description for your filter.

h. Click the 'OK' button. Click 'OK' again in the 'IP Filter List' window to save the settings.

3. Building Filter List 2 – Watson to Windows XP:

a. Under the IP Filter List tab of the 'New Rule Properties' window, click the 'Add' button. The 'IP Filter List' window appears (see Figure 8-82).

b. Enter the name "Watson to Windows XP" for the filter list, deselect the 'Use Add Wizard' check box, and click the 'Add' button. The 'Filter Properties' window appears.

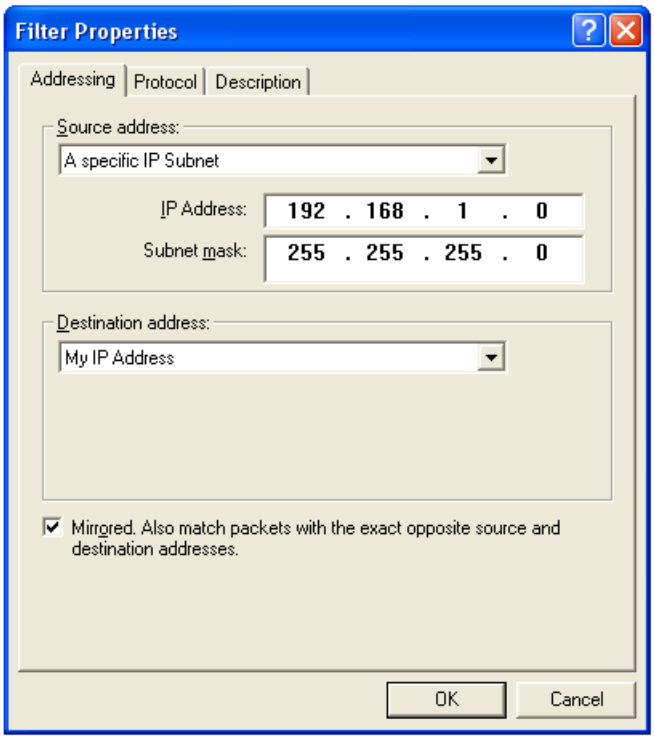


Figure 8-84: Windows XP to Watson Filter Properties

c. In the 'Source address' drop-down menu, select 'A Specific IP Subnet'. In the 'IP Address' field enter the LAN Subnet (<Watson_lan_subnet>), and in the 'Subnet mask' field enter 255.255.255.0.

d. In the 'Destination address' drop-down menu, select 'My IP Address'.

e. Click the 'Description' tab if you would like to enter a description for your filter.

f. Click the 'OK' button. Click 'OK' again in the 'IP Filter List' window to save the settings.

4. Configuring Individual Rule of Tunnel 1 (Windows XP to Watson):

a. Under the 'IP Filter List' tab of the 'New Rule Properties' window, select the 'Windows XP to Watson' radio button.

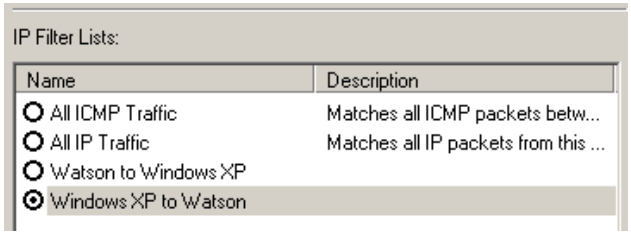


Figure 8-85: IP Filter List

b. Click the 'Filter Action' tab.

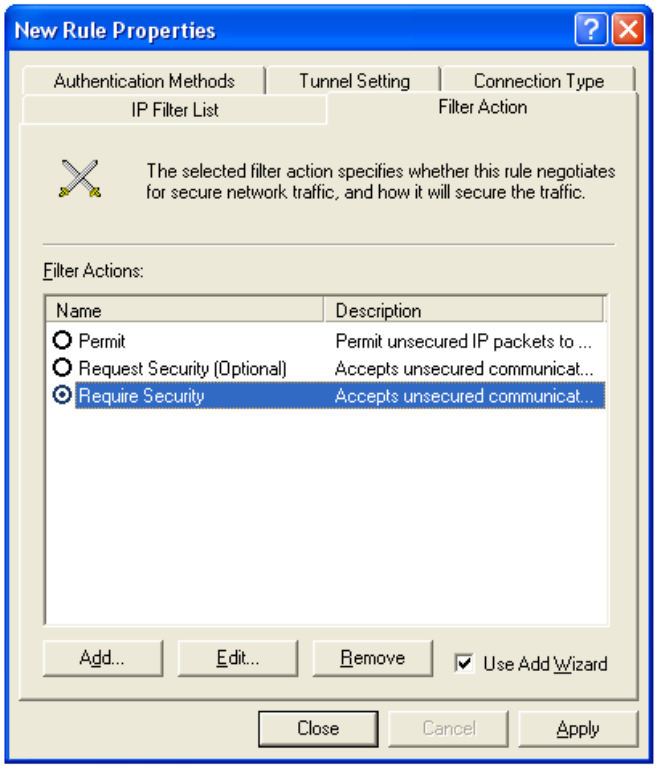


Figure 8-86: Filter Action

c. Select the 'Require Security' radio button, and click the 'Edit' button. The 'Require Security Properties' window appears.

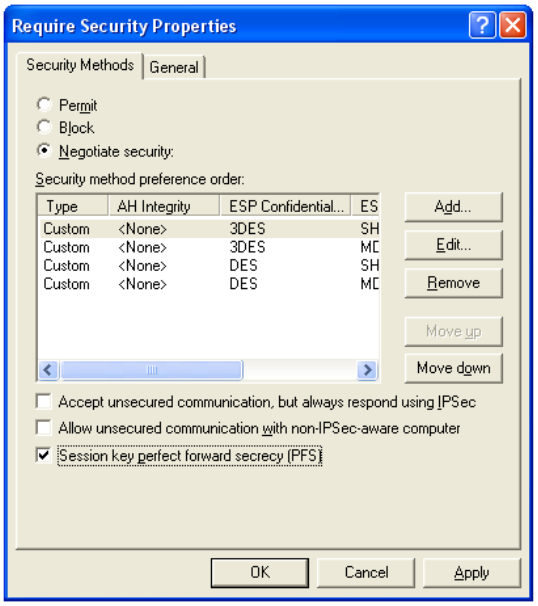


Figure 8-87: Require Security Properties

d. Verify that the 'Negotiate security' option is enabled, and deselect the 'Accept unsecured communication, but always respond using IPSec' check box. Select the 'Session key Perfect Forward Secrecy (PFS)' (the PFS option must be enabled on Watson), and click the OK button.

e. Under the 'Authentication Methods' tab, click the Edit button. The 'Edit Authentication Method Properties' window appears.

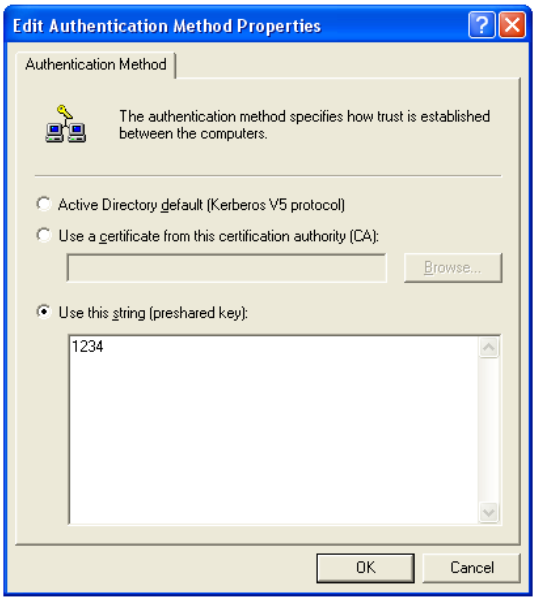

Edit Authentication Method Properties
Authentication Method
The authentication method specifies how trust is established between the computers.
Active Directory default (Kerberos V5 protocol)
Use a certificate from this certification authority (CA):
Browse...
Use this string (preshared key):
1234
OK
Cancel

Figure 8-88: Edit Authentication Method Properties

f. Select the 'Use this string (preshared key)' radio button, and enter a string that will be used as the key (for example, 1234). Click the 'OK' button.

g. Under the 'Tunnel Setting' tab, select the 'The tunnel endpoint is specified by this IP Address' radio button, and enter <Watson_wan_ip>.

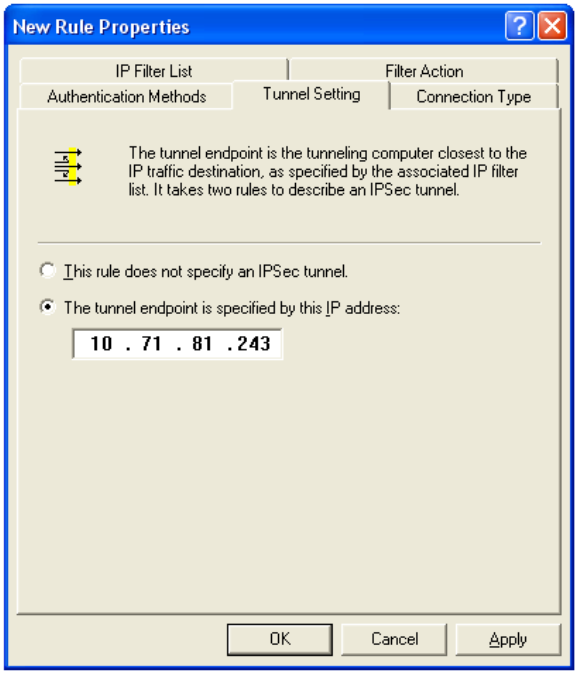

New Rule Properties
IP Filter List
Filter Action
Authentication Methods
Tunnel Setting
Connection Type
The tunnel endpoint is the tunneling computer closest to the IP traffic destination, as specified by the associated IP filter list. It takes two rules to describe an IPSec tunnel.
This rule does not specify an IPSec tunnel.
The tunnel endpoint is specified by this IP address:
10 . 71 . 81 . 243
OK
Cancel
Apply

Figure 8-89: Tunnel Setting

h. Under the 'Connection Type' tab, verify that 'All network connections' is selected.

i. Click the 'Apply' button and then click the 'OK' button to save this rule.

5. Configuring Individual Rule of Tunnel 2 (Watson to Windows XP):

a. Under the 'IP Filter List' tab of the 'New Rule Properties' window, select the 'Watson to Windows XP' radio button.

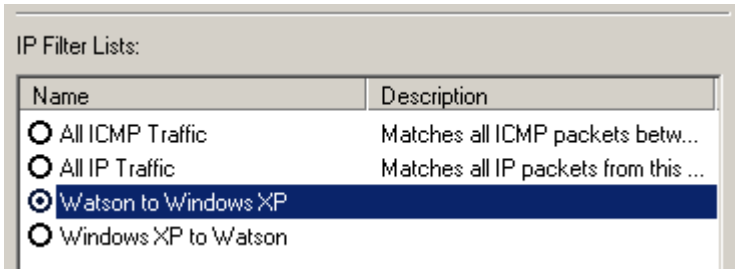


Figure 8-90: IP Filter List

b. Click the 'Filter Action' tab (see Figure 8-86).

c. Select the 'Require Security' radio button, and click the 'Edit' button. The 'Require Security Properties' window appears (see Figure 8-87).

d. Verify that the 'Negotiate security' option is enabled, and deselect the 'Accept unsecured communication, but always respond using IPSec' check box. Select the 'Session key Perfect Forward Secrecy (PFS)' (the PFS option must be enabled on Watson), and click the OK button.

e. Under the 'Authentication Methods' tab, click the Edit button. The 'Edit Authentication Method Properties' window appears (see Figure 8-88).

f. Select the 'Use this string (preshared key)' radio button, and enter a string that will be used as the key (for example, 1234). Click the 'OK' button.

g. Under the 'Tunnel Setting' tab, select the 'The tunnel endpoint is specified by this IP Address' radio button, and enter <windows_ip>.

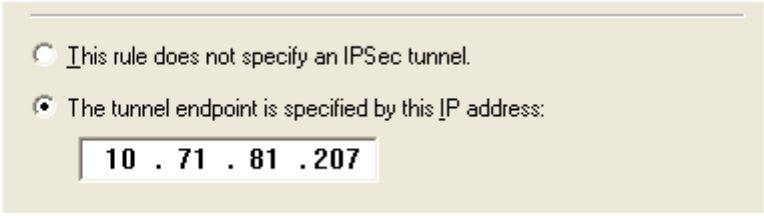


Figure 8-91: Tunnel Setting

h. Under the 'Connection Type' tab, verify that 'All network connections' is selected.

i. Click the 'Apply' button and then click the 'OK' button to save this rule.

j. Back on the 'Watson Connection Properties' window, note that the two new rules have been added to the 'IP Security rules' list.

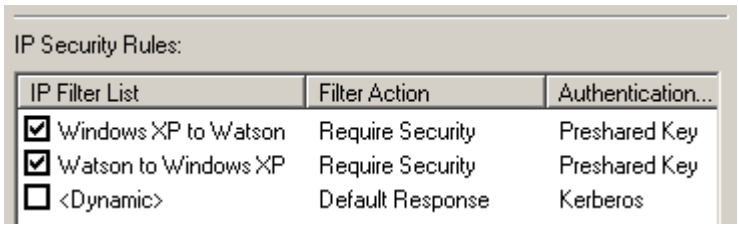


Figure 8-92: Watson Connection Properties

k. Click 'Close' to go back to the 'Local Security Settings' window (see Figure 8-75).

6. Assigning the New IPSec Policy: In the 'Local Security Settings' window, right-click the 'Watson Connection' policy, and select 'Assign'. A small green arrow will appear on the policy's folder icon and its status under the 'Policy Assigned' column will change to 'Yes'.

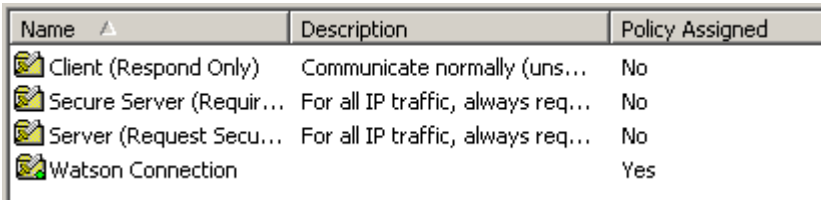


Figure 8-93: Local Security Settings

8.4.1.5 IPSec Gateway-to-Gateway Connection Scenario

This section describes how to configure an IPSec gateway to gateway with a pre-shared secret scenario, developed by the VPN Consortium (VPNC) using Watson.

8.4.1.5.1 Network Configuration

Establishing an IPSec tunnel between Gateways A and B creates a transparent and secure network for clients from subnets A and B, who can communicate with each other as if they were inside the same network.The following scenario depicts such a connection between two Watson gateways. The configurations of both gateways are identical, except for their IP addresses. This section describes the configuration of Gateway A only. The same configuration must be performed on Gateway B, with the exceptions that appear in the note admonitions.

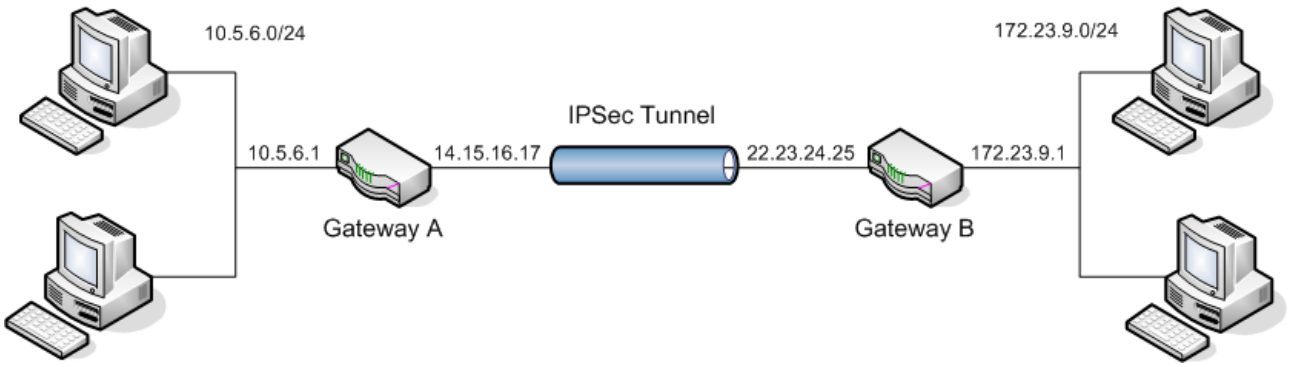


Figure 8-94: Configuration Diagram

1. LAN Interface Settings

a. Under the 'System' tab, click the 'Network Connections' menu item. The 'Network Connections' screen appears.

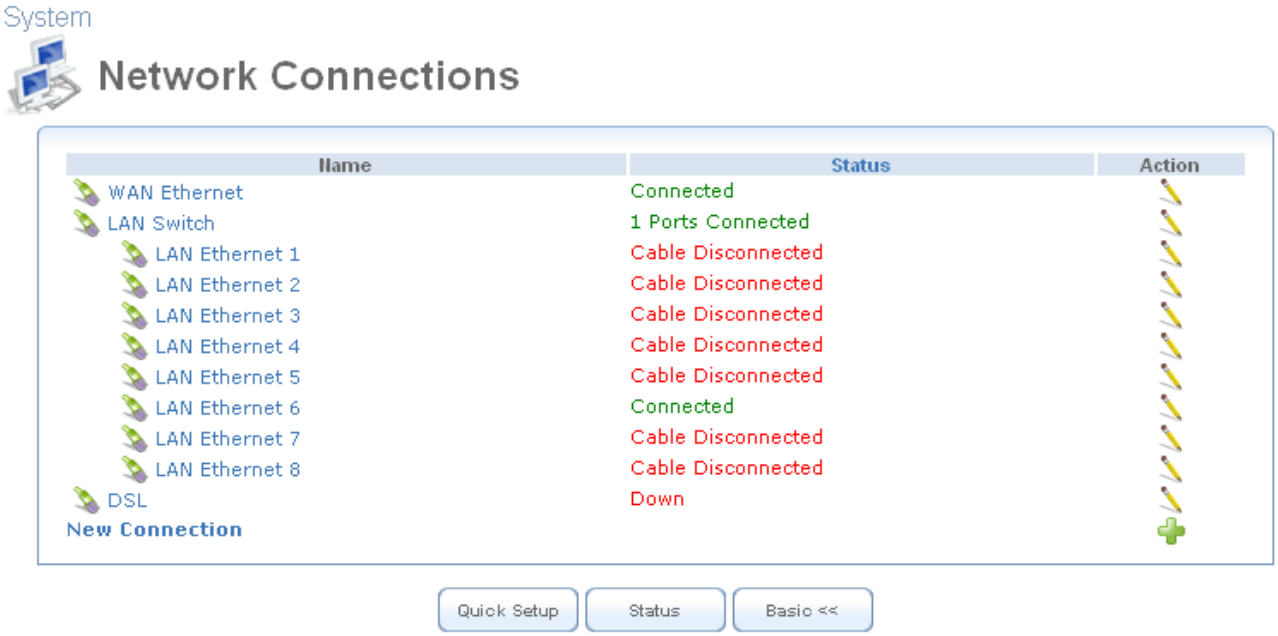


Figure 8-95: Network Connections

b. If your LAN Ethernet connection is bridged, click the 'LAN Bridge' link. Otherwise, click the 'LAN Switch' link. The 'LAN Switch Properties' screen appears.

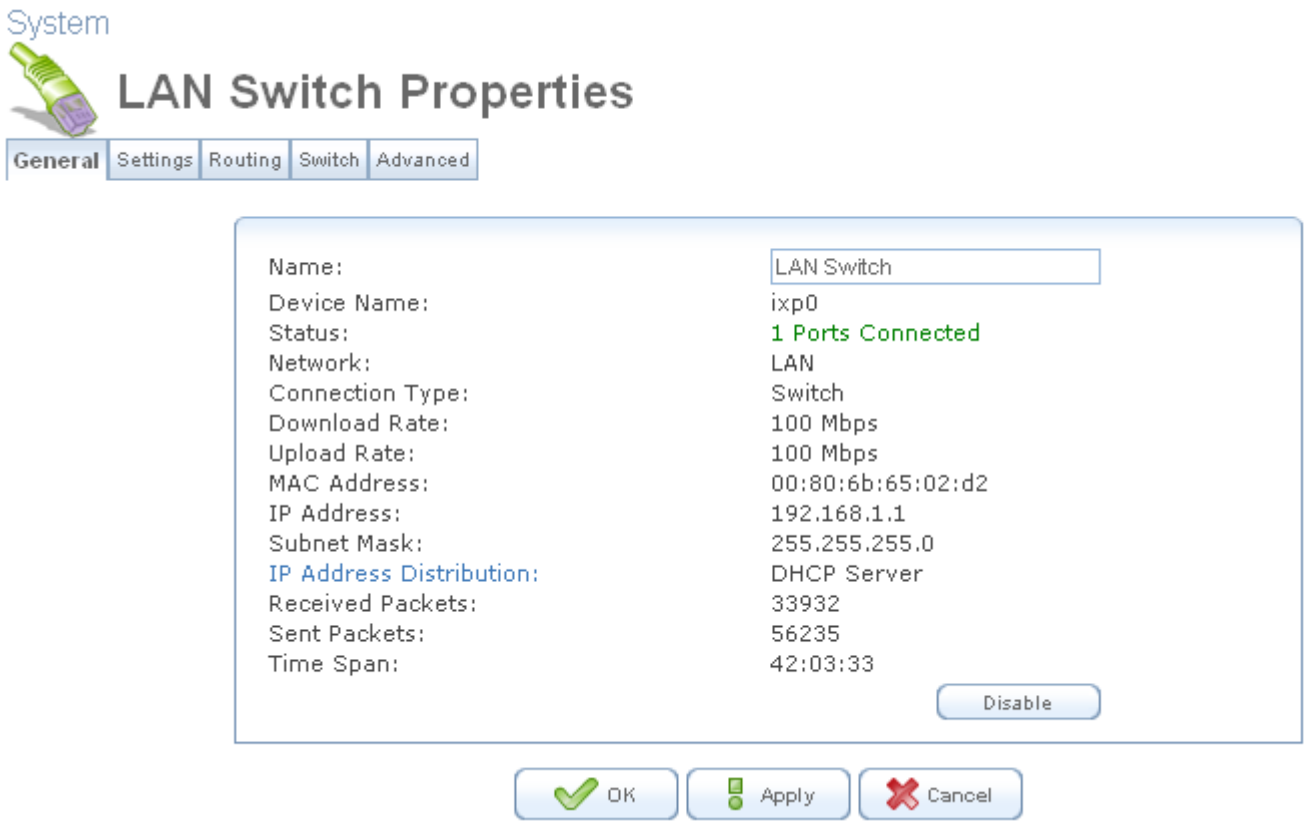


Figure 8-96: LAN Switch Properties – General

c. Press the 'Settings' tab, and configure the following settings:

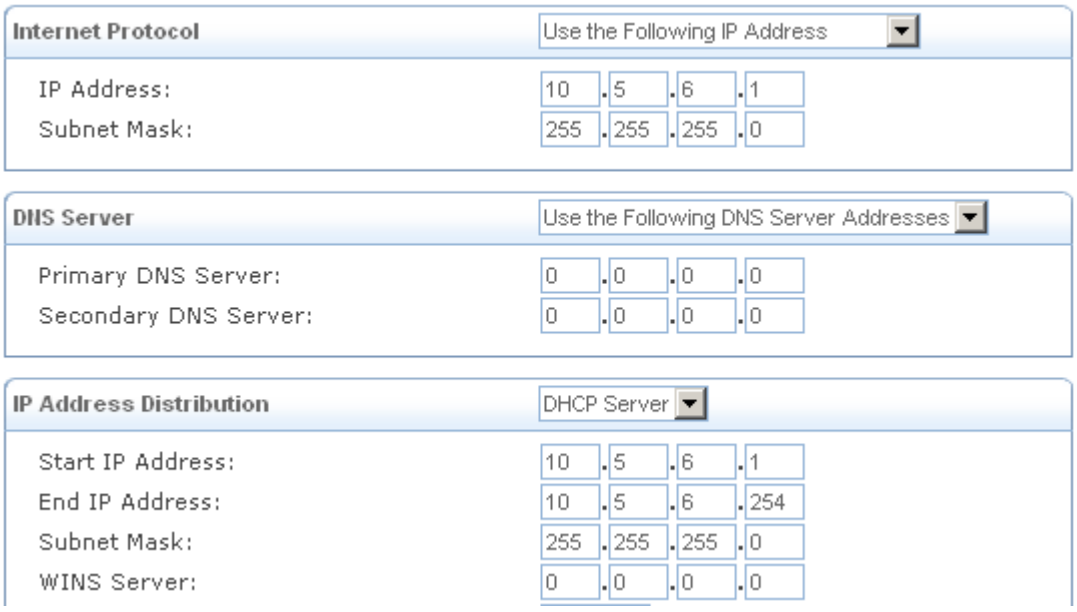

Internet Protocol
Use the Following IP Address
IP Address:
10 . 5 . 6 . 1
Subnet Mask:
255 . 255 . 255 . 0
DNS Server
Use the Following DNS Server Addresses
Primary DNS Server:
0 . 0 . 0 . 0
Secondary DNS Server:
0 . 0 . 0 . 0
IP Address Distribution
DHCP Server
Start IP Address:
10 . 5 . 6 . 1
End IP Address:
10 . 5 . 6 . 254
Subnet Mask:
255 . 255 . 255 . 0
WINS Server:
0 . 0 . 0 . 0

Figure 8-97: LAN Switch Properties – Settings

Internet Protocol	Select "Use the Following IP Address"
IP Address	Specify 10.5.6.1
Subnet Mask	Specify 255.255.255.0
IP Address Distribution	Select "DHCP Server"
Start IP Address	Specify 10.5.6.1
End IP Address	Specify 10.5.6.254
Subnet Mask	Specify 255.255.255.0

Note: When configuring Gateway B, the IP address should be 172.23.9.1, according to the example depicted above.

d. Click 'OK' to save the settings.

2. WAN Interface Settings

a. Under the 'System' tab, click the 'Network Connections' menu item. The 'Network Connections' screen appears.

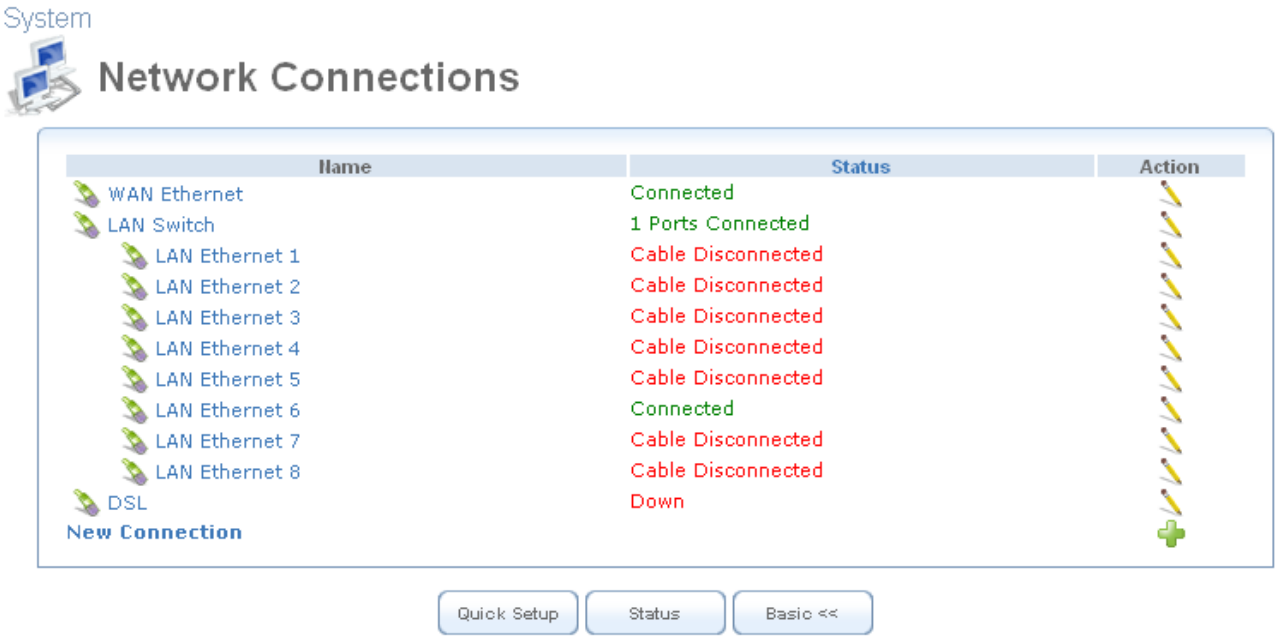


Figure 8-98: Network Connections

b. Click the 'WAN Ethernet' link, the 'WAN Ethernet Properties' screen appears.

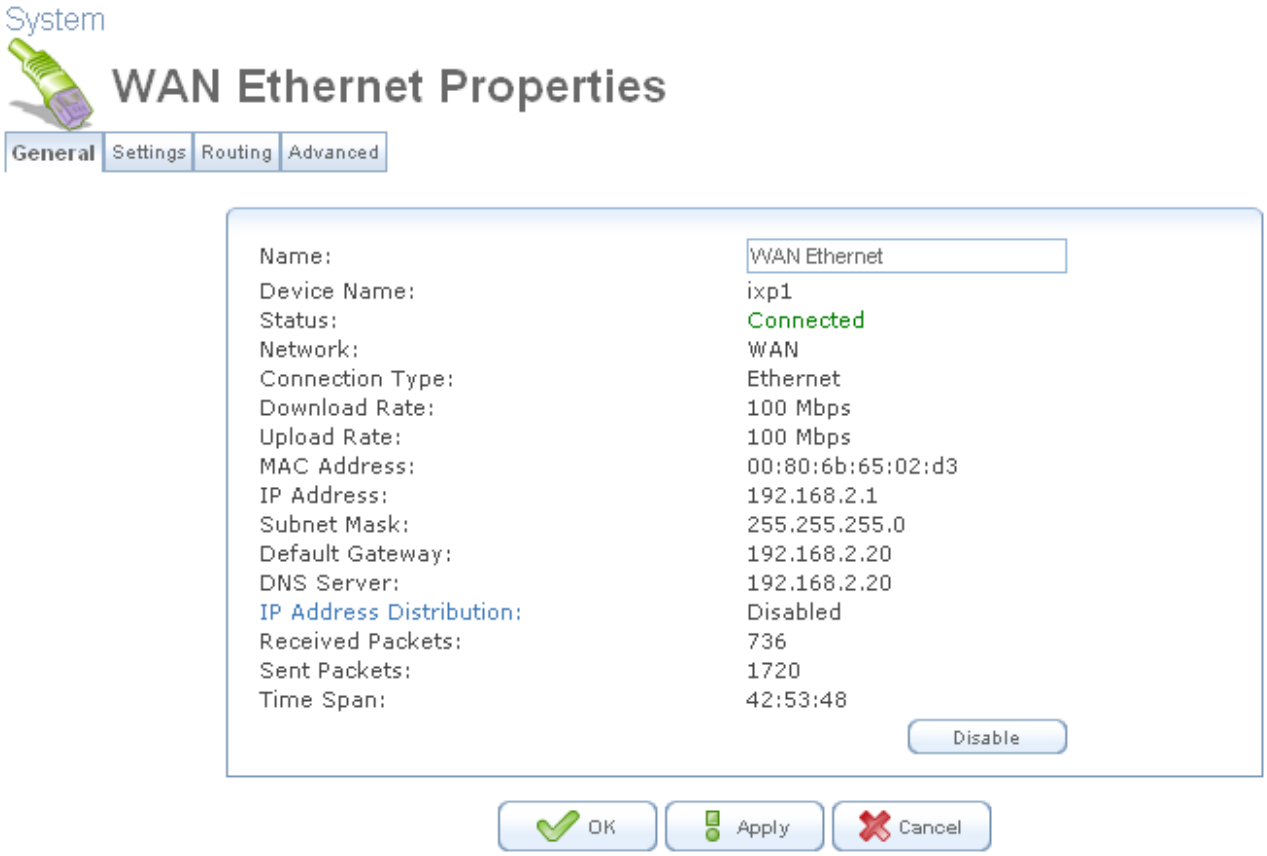


Figure 8-99: WAN Ethernet Properties – General

c. Press the 'Settings' tab, and configure the following settings:

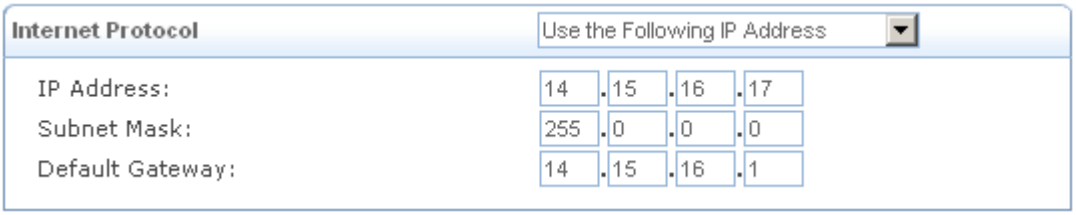


Figure 8-100: WAN Ethernet Properties – Settings

Internet Protocol Select "Use the Following IP Address"

IP Address Specify 14.15.16.17

Subnet Mask Specify the appropriate subnet mask, i.e 255.0.0.0

Default Gateway Specify the appropriate Default Gateway in order to enable IP routing, i.e 14.15.16.1

Note: When configuring Gateway B, the IP address should be 22.23.24.25, and the default gateway 22.23.24.1, according to the example depicted here.

d. Click 'OK' to save the settings.

8.4.1.5.2 Gateway-to-Gateway with Pre-shared Secrets

A typical gateway-to-gateway VPN uses a pre-shared secret for authentication. Gateway A connects its internal LAN 10.5.6.0/24 to the Internet. Gateway A's LAN interface has the address 10.5.6.1, and its WAN (Internet) interface has the address 14.15.16.17. Gateway B connects the internal LAN 172.23.9.0/24 to the Internet. Gateway B's WAN (Internet) interface has the address 22.23.24.25. The Internet Key Exchange (IKE) Phase 1 parameters used are:

- Main mode
- 3DES (Triple DES)
- SHA-1
- MODP group 2 (1024 bits)
- Pre-shared secret of "hr5x"
- SA lifetime of 28800 seconds (eight hours) with no Kbytes re-keying

The IKE Phase 2 parameters used are:

- 3DES (Triple DES)
- SHA-1
- ESP tunnel mode
- MODP group 2 (1024 bits)
- Perfect forward secrecy for re-keying
- SA lifetime of 3600 seconds (one hour) with no Kbytes re-keying
- Selectors for all IP protocols, all ports, between 10.5.6.0/24 and 172.23.9.0/24, using IPv4 subnets

To set up Gateway A for this scenario, follow these steps:

1. Under the 'System' tab, click the 'Network Connections' menu item. The 'Network Connections' screen appears.

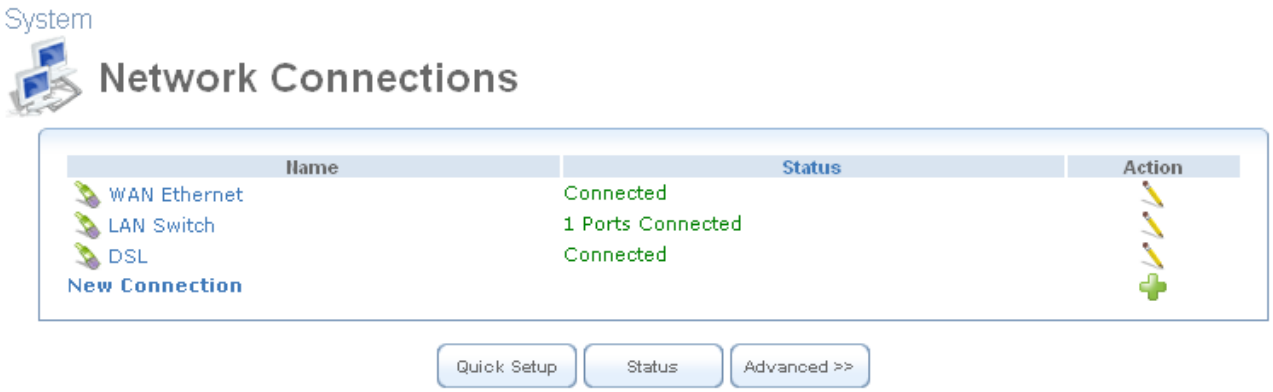


Figure 8-101: Network Connections

2. Click the 'New Connection' link. The 'Connection Wizard' screen appears.

System
Connection Wizard
Choose the type of network connection you want to create, based on your network configuration and your networking needs.
Internet Connection
Connect to the Internet using your DSL connection so you can browse the Web and read email.
Connect to a Virtual Private Network over the Internet
Connect Watson to a business network using a Virtual Private Network (VPN) so you can work from home, workplace or another location.
Advanced Connection
Manually configure a new connection.
Next
Cancel

Figure 8-102: Connection Wizard

3. Select the 'Connect to a Virtual Private Network over the Internet' radio button and click 'Next'. The 'Connect to a Virtual Private Network over the Internet' screen appears.

System
Connect to a Virtual Private Network over the Internet
Choose your VPN connection type:
VPN Client or Point-To-Point
Connect to your business network from home or another location, using a Virtual Private Network (VPN) over the Internet.
VPN Server
Enable Virtual Private Network (VPN) connections to Watson from other locations.
Back
Next
Cancel

Figure 8-103: Connect to a Virtual Private Network over the Internet

4. Select the 'VPN Client or Point-To-Point' radio button and click 'Next'. The 'VPN Client or Point-To-Point' screen appears.

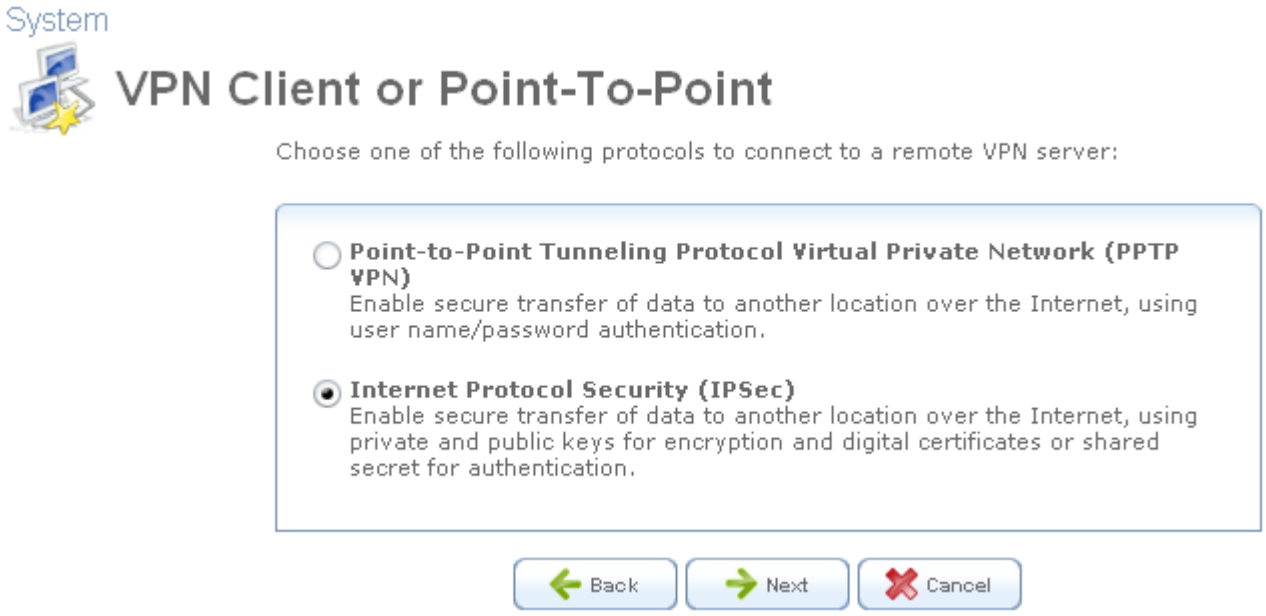

System
VPN Client or Point-To-Point
Choose one of the following protocols to connect to a remote VPN server:
Point-to-Point Tunneling Protocol Virtual Private Network (PPTP VPN)
Enable secure transfer of data to another location over the Internet, using user name/password authentication.
Internet Protocol Security (IPSec)
Enable secure transfer of data to another location over the Internet, using private and public keys for encryption and digital certificates or shared secret for authentication.
Back
Next
Cancel

Figure 8-104: VPN Client or Point-To-Point

5. Select the 'Internet Protocol Security (IPSec)' radio button and click 'Next'. The 'Internet Protocol Security (IPSec)' screen appears.

Figure 8-105: Internet Protocol Security (IPSec)

6. Specify the following parameters, as depicted in Figure 8-106

Host Name or IP Address of Destination Gateway Specify 22.23.24.25

Remote IP Select "IP Subnet"

Remote Subnet IP Address Specify 172.23.9.0

Remote Subnet Mask Specify 255.255.255.0

Shared Secret Specify "hr5x"

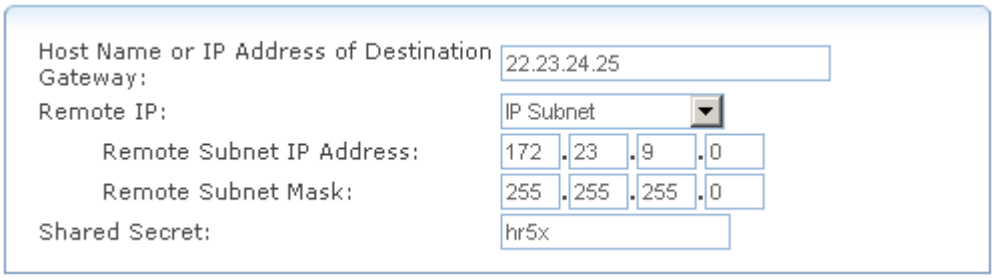


Figure 8-106: Internet Protocol Security (IPSec)

7. Click 'Next', the 'Connection Summary' screen appears.

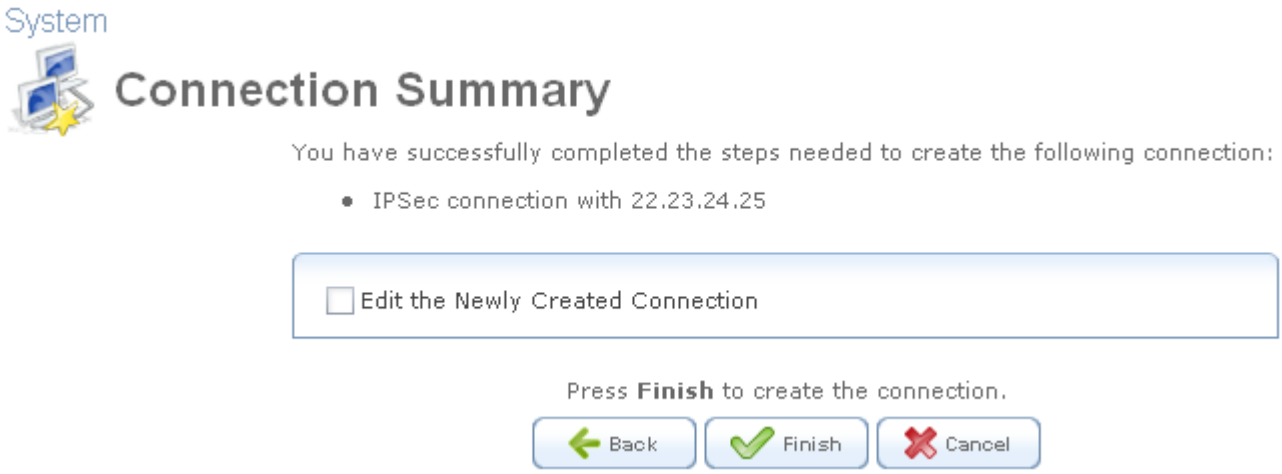


Figure 8-107: Connection Summary

8. Select the 'Edit the Newly Created Connection' check box, and click 'Finish'. The 'VPN IPSec Properties' screen appears, displaying the 'General' tab.
9. Press the 'IPSec' tab, and configure the following settings:
   - Deselect the 'Compress' check box.
   - Under 'Hash Algorithm', deselect the 'Allow Peers to Use MD5' check box.
   - Under 'Group Description Attribute', deselect the 'DH Group 5 (1536 bit)' check box.
   - Under 'Encryption Algorithm', deselect the 'Allow AH Protocol (No Encryption)' check box.
10. Click 'OK' to save the settings. The 'Network Connections' screen appears. Note that the IPSec connection's status has changed to "Connected".

8.4.1.5.3 Gateway-to-Gateway with Peer Authentication of Certificates

An additional authentication method for a gateway-to-gateway VPN is peer authentication of certificates. Authentication is performed when each gateway presents a certificate, signed by a mutually agreed upon Certificate Authority (CA), to the other gateway.

For testing purposes, Linux provides a mechanism for creating self-signed certificates, thus eliminating the need to acquire them from the CA. This section provides a description for this procedure, after which you will be able to use these certificates for authentication of the gateway-to-gateway VPN connection.

To create a self-signed certificate, perform the following:

1. Install the OpenSSL Debian package:

```
$ rt apt-get install openssl
```

2. Create a directory for the certificates:

```
$ cd ~
$ mkdir cert_create
$ cd cert_create/
```

3. Use the Linux 'CA.sh' utility. Note that only the required fields are listed below. For the rest, you may simply press Enter.

```
$ /usr/lib/ssl/misc/CA.sh -newca
    Enter PEM pass phrase: <enter a password>
    Common Name: <enter your CA name>
    Enter pass phrase for ./demoCA/private/./cakey.pem: <enter a
password>
```

For more information about this script, run 'man CA.pl' (CA.pl and CA.sh are the same).

4. Copy the certificates from the /demoCA directory under which they were created, providing them with your CA name.

```
$ cp demoCA/cacert.pem <your CA name>_cacert.pem
$ cp demoCA/careq.pem <your CA name>_careq.pem
```

5. Load the new certificates to both gateways:

   a. Browse to the 'Advanced' tab and click the 'Certificates' icon.

   b. Select the 'CA's' sub-tab and click 'Upload Certificate'. The 'Load CA's Certificate' screen appears.

   c. Browse for the location of the certificate, which is ~/cert_create/<your CA name>_cacert.pem, and click 'Upload'.

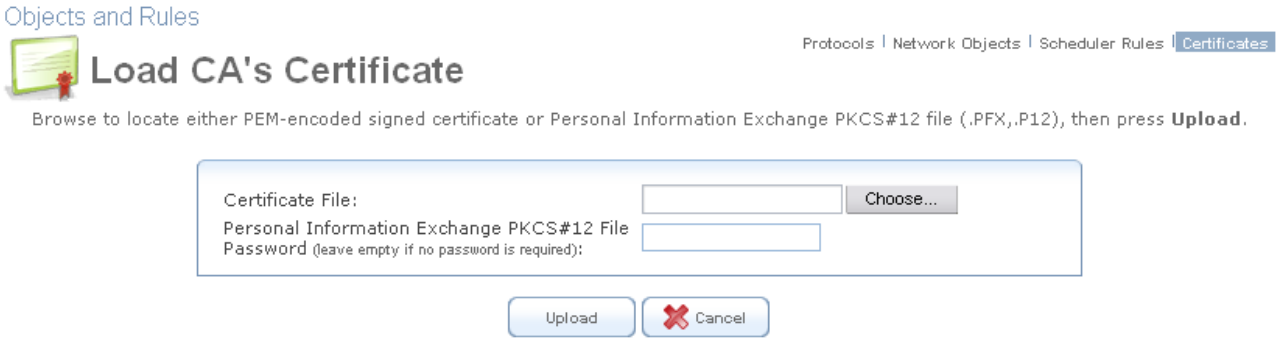

Objects and Rules
Protocols | Network Objects | Scheduler Rules | Certificates
Load CA's Certificate
Browse to locate either PEM-encoded signed certificate or Personal Information Exchange PKCS#12 file (.PFX,.P12), then press Upload.
Certificate File:
Choose...
Personal Information Exchange PKCS#12 File Password (leave empty if no password is required):
Upload
Cancel

Figure 8-108: Load CA's Certificate

6. Generate a certificate request from both gateways:

   a. Browse to the 'Advanced' tab and click the 'Certificates' icon.

   b. In the 'Watson's Local' sub-tab, click 'Create Certificate Request'. The 'Create X509 Request' screen appears.

c. In the 'Certificate Name' field, enter "Watson-1" (and "Watson-2" on the other gateway, respectively).

Figure 8-109: Create X509 Request

d. Click 'Generate' and then 'Refresh'. The 'New X509 Request' screen appears.

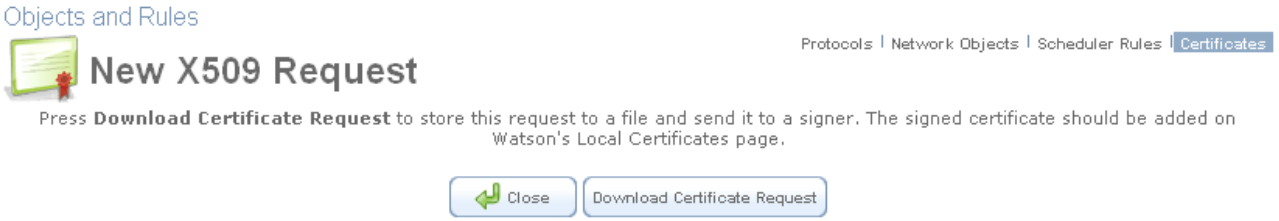

Objects and Rules
New X509 Request
Protocols | Network Objects | Scheduler Rules | Certificates
Press Download Certificate Request to store this request to a file and send it to a signer. The signed certificate should be added on Watson's Local Certificates page.
Close
Download Certificate Request

Figure 8-110: New X509 Request

e. Click 'Download Certificate Request', and save the file under ~/cert_create/Watson-1/2_Watson.csr.

Do not delete the empty certificate that now appears under the 'Watson's Local' sub-tab, as this is the request itself. If you delete it, the certificate will not be accepted by Watson.

7. Sign the certificate request using the 'CA.sh' script on both gateways:

```
$ mv <Watson-1>.csr newreq.pem
$ /usr/lib/ssl/misc/CA.sh -sign
    Enter pass phrase for ./demoCA/private/cakey.pem: <enter a
password>
    Sign the certificate? [y/n]: <choose y>
    1 out of 1 certificate requests certified, commit? [y/n]
<choose y>
$ mv newcert.pem <Watson-1>_newcert.pem
$ mv newreq.pem <Watson-1>_newreq.pem

<Repeat the above for Watson-2>
```

8. Load the certificates to both gateways:

a. Browse to the 'Advanced' tab and click the 'Certificates' icon.

b. In the 'Watson's Local' sub-tab, click 'Upload Certificate'. The 'Load Watson's Local Certificate' screen appears.

c. Browse for the location of the certificate, which is ~/cert_create/<Watson-1/2>_newcert.pem, and click 'Upload'.

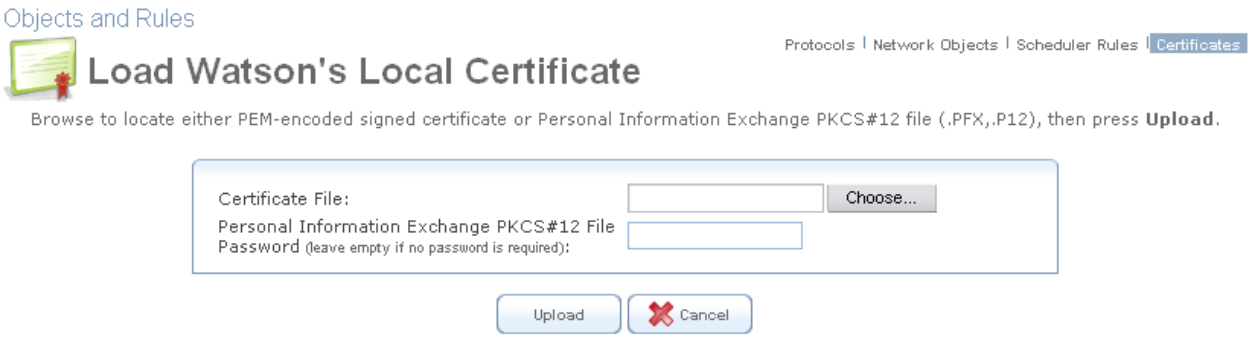

Objects and Rules
Protocols | Network Objects | Scheduler Rules | Certificates
Load Watson's Local Certificate
Browse to locate either PEM-encoded signed certificate or Personal Information Exchange PKCS#12 file (.PFX,.P12), then press Upload.
Certificate File:
Choose...
Personal Information Exchange PKCS#12 File Password (leave empty if no password is required):
Upload
Cancel

Figure 8-111: Load Watson's Local Certificate

To authenticate the VPN connection with the created certificates, perform the following:

1. Click the 'VPN IPSec' link in the 'Network Connections' screen, and then click the 'IPSec' sub-tab.
2. In the 'IPSec Automatic Phase 1' section, in the 'Peer Authentication' drop-down menu, select "Certificate". The screen refreshes, providing additional settings.

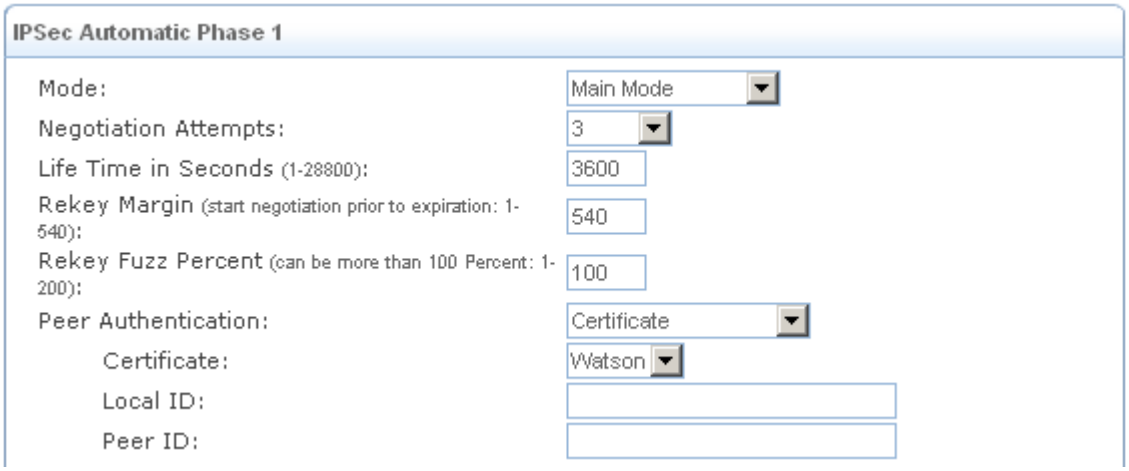


Figure 8-112: VPN IPSec Properties

3. In the 'Certificate' drop-down menu, select Gateway A's newly added certificate.
4. In the 'Local ID' field, enter Gateway A's certificate details. You can copy these details from the 'Certificates' screen under the 'Advanced' tab. Click the certificate and copy the details from the subject field, for example "C=CH, CN=Watson-1".
5. In the 'Peer ID' field, enter Gateway B's certificate details, for example "C=CH, CN=Watson-2".
6. Click 'OK' to save the settings.

Perform the same procedure on Gateway B with its respective parameters. When done, the IPSec connection's status should change to "Connected".

8.4.2 Point-to-Point Tunneling Protocol Server

Watson can act as a Point-to-Point Tunneling Protocol Server (PPTP Server), accepting PPTP client connection requests.

8.4.2.1 Configuring the PPTP Server

Access this feature either from its link in the 'VPN' tab under the 'Services' screen, or by clicking the 'PPTP Server' icon in the 'Advanced' screen. The 'Point-to-Point Tunneling Protocol Server (PPTP Server)' screen appears:

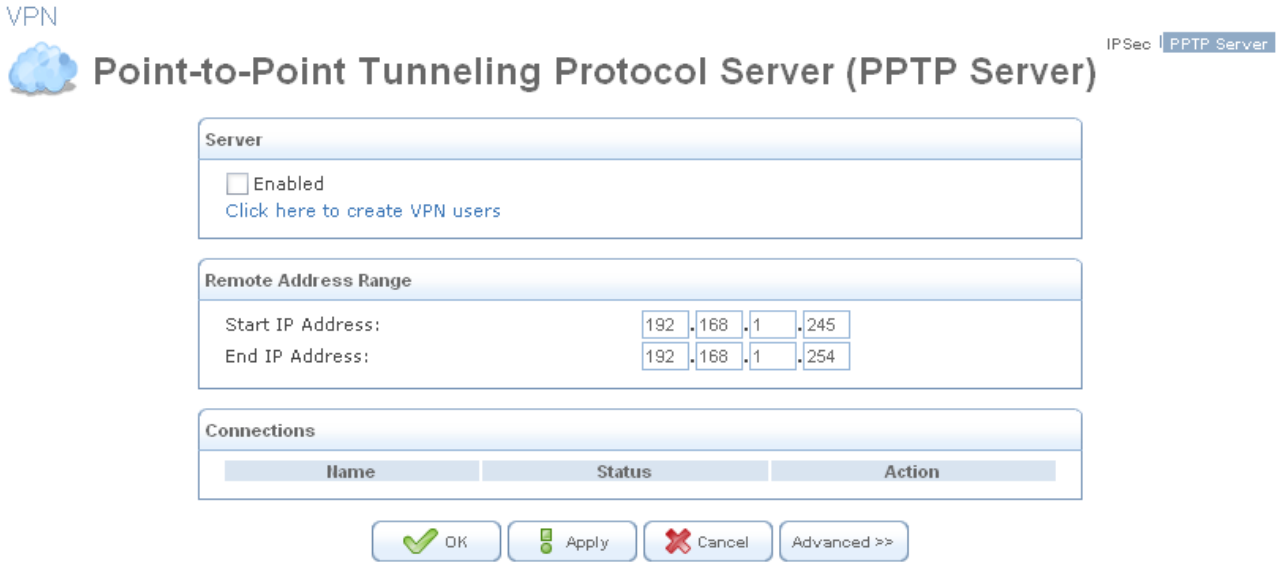


Figure 8-113: Point-to-Point Tunneling Protocol Server (PPTP Server)

This screen enables you to configure:

Enabled Check or un-check this box to enable or disable this feature.

Note that checking this box creates a PPTP server (if not yet created with the wizard), but does not define remote users.

Click Here to Create VPN Users Click this link to define remote users that will be granted access to your home network. Refer to Section 9.3 to learn how to define and configure users.

Remote Address Range Use the 'Start IP Address' and 'End IP Address' fields to specify the range of IP addresses that will be granted by the PPTP server to the PPTP client.

8.4.2.2 Advanced PPTP Server Settings

To configure advanced PPTP server settings press the 'Advanced' button on the PPTP screen. The screen expands, offering additional settings:

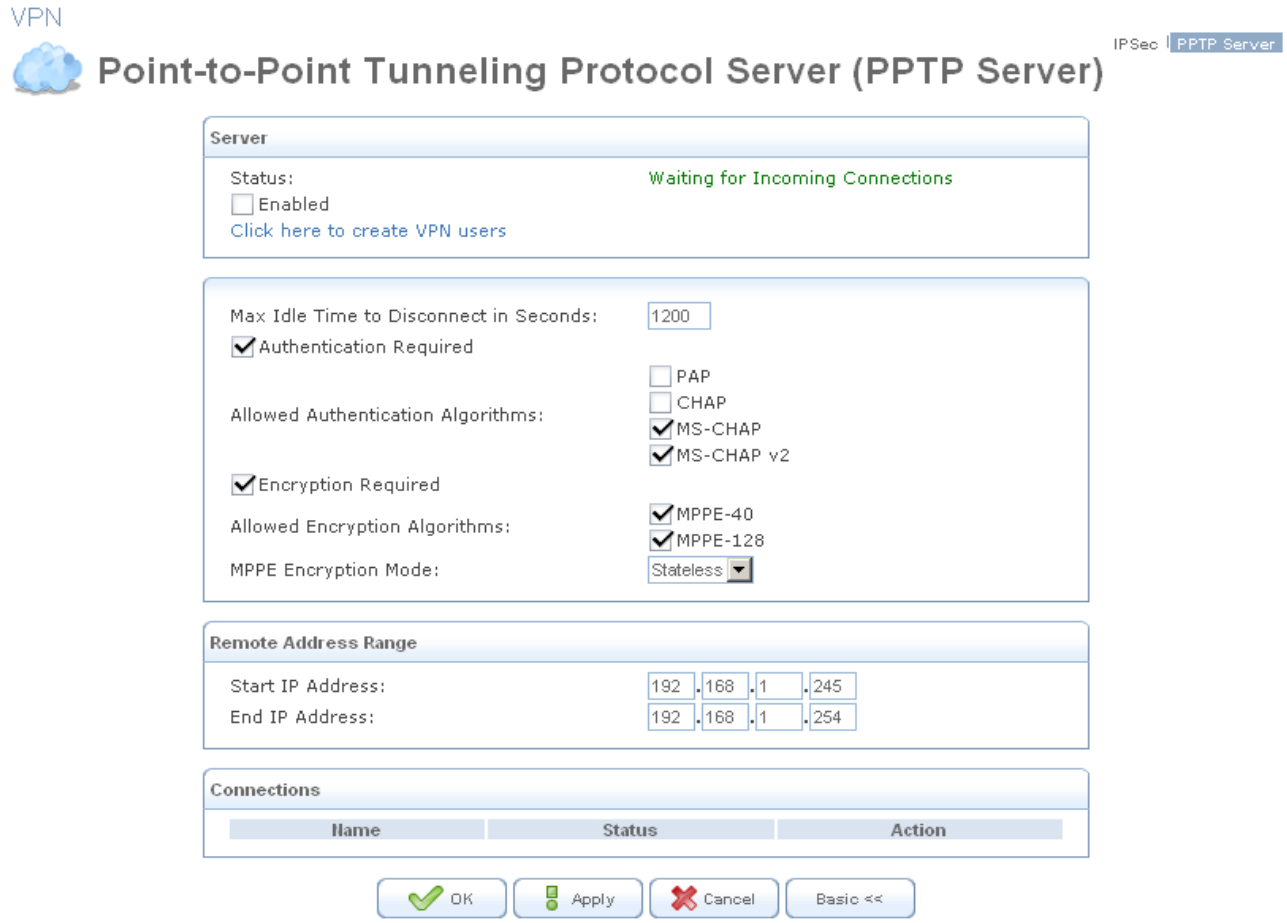


Figure 8-114: Advanced PPTP Server Parameters

Maximum Idle Time to Disconnect in Seconds Specify the amount of idle time (during which no data is sent or received) that should elapse before the gateway disconnects a PPTP connection.

Authentication Required Select whether PPTP will use authentication.

Allowed Authentication Algorithms Select the algorithms the server may use when authenticating its clients.

Encryption Required Select whether PPTP will use encryption.

Allowed Encryption Algorithms Select the algorithms the server may use when encrypting data.

MPPE Encryption Mode Select the Microsoft Point-to-Point Encryption mode: stateless or stateful.

Please note that the server settings must be in tune with the client settings, described in Section 9.4.12.

8.5 Personal Domain Name (Dynamic DNS)

The Dynamic DNS (DDNS) service enables you to alias a dynamic IP address to a static hostname, allowing your computer to be more easily accessible from various locations on the Internet. Typically, when you connect to the Internet, your service provider assigns an unused IP address from a pool of IP addresses, and this address is used only for the duration of a specific connection. Dynamically assigning addresses extends the usable pool of available IP addresses, whilst maintaining a constant domain name. When using the DDNS service, each time the IP address provided by your ISP changes, the DNS database will change accordingly to reflect the change. In this way, even though your IP address will change often, your domain name will remain constant and accessible.

8.5.1 Opening a Dynamic DNS Account

In order to use the DDNS feature, you must first obtain a DDNS account. For example, you can open a free account at http://www.dyndns.com/account/create.html . When applying for an account, you will need to specify a user name and password. Please have them readily available when customizing Watson's DDNS support.

8.5.2 Using Dynamic DNS

Use the DDNS feature to define a static host name for your WAN connection. Moreover, you can define more than one static host name for your WAN connection, by simply repeating the following procedure.

1. Access this feature either from the 'DDNS' tab under the 'Services' screen, or by clicking its icon in the 'Advanced' screen. The 'Dynamic DNS' connections screen appears. This screen displays a table that will present the different connections and their DDNS aliases.

Figure 8-115: Dynamic DNS

2. Click the 'New Dynamic DNS Entry' link to add a new DDNS entry. The 'Dynamic DNS' screen appears:

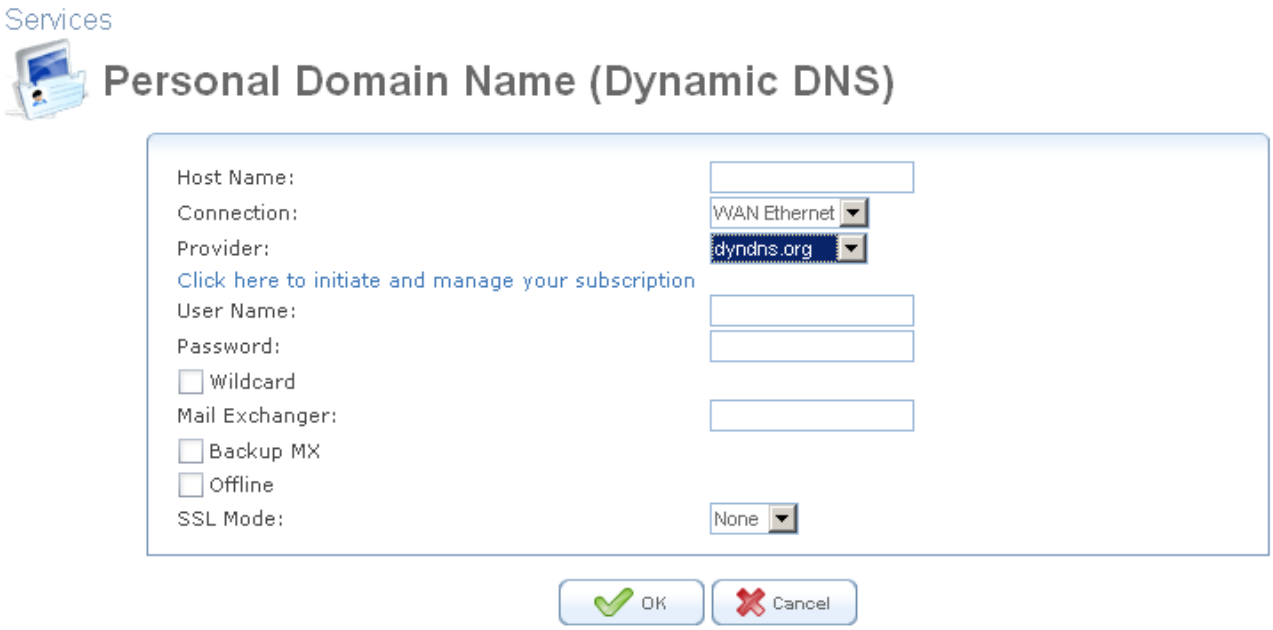


Figure 8-116: Dynamic DNS

3. Specify the DDNS parameters:

Host Name Enter your full DDNS domain name.

Connection Select the connection to which you would like to couple the DDNS service.

Provider Select your DDNS service provider. The screen will refresh, displaying the parameters required by each provider. The provider depicted herein is dyndns, which includes all available parameters.

Click Here to Initiate and Manage your Subscription Clicking this link will open the selected provider's account creation Web page. For example, when dyndns.org is selected, the following page will open: http://www.dyndns.com/account/.

User Name Enter your DDNS user name.

Password Enter your DDNS password.

Wildcard Select this check-box to enable use of special links such as http://www.<your host>.dyndns.com.

Mail Exchanger Enter your mail exchange server address, to redirect all e-mails arriving at your DDNS address to your mail server.

Backup MX Select this check-box to designate the mail exchange server to be a backup server.

Offline If you wish to temporarily take your site offline (prevent traffic from reaching your DDNS domain name), check this box to enable redirection of DNS requests to an alternative URL, predefined in your DDNS account. The availability of this feature depends on your account's level and type of service.

SSL Mode With Watson versions that support Secure Socket Layer (SSL), secured DDNS services are accessed using HTTPS. Upon connection, Watson validates the DDNS server's certificate. Use this entry to choose the certificate's validation method.

None Do not validate the server's certificate.

Chain Validate the entire certificate chain. When selecting this option, the screen will refresh, displaying an additional combo box for selecting whether to validate the certificate's expiration time. Choose 'Ignore' or 'Check' respectively. If the certificate has expired, the connection will terminate immediately.

Figure 8-117: SSL Mode

Direct Insure that the server's certificate is directly signed by the root certificate. This option also provides the 'Validate Time' combo box for validation of the certificate's expiration time, as described above.

8.6 Advanced

8.6.1 DNS Server

Domain Name System (DNS) provides a service that translates domain names into IP addresses and vice versa. The gateway's DNS server is an auto-learning DNS, which means that when a new computer is connected to the network the DNS server learns its name and automatically adds it to the DNS table. Other network users may immediately communicate with this computer using either its name or its IP address. In addition your gateway's DNS:

- Shares a common database of domain names and IP addresses with the DHCP server.
- Supports multiple subnets within the LAN simultaneously.
- Automatically appends a domain name to unqualified names.
- Allows new domain names to be added to the database using Watson's WBM.
- Permits a computer to have multiple host names.
- Permits a host name to have multiple IPs (needed if a host has multiple network cards).

The DNS server does not require configuration. However, you may wish to view the list of computers known by the DNS, edit the host name or IP address of a computer on the list, or manually add a new computer to the list.

8.6.1.1 Viewing and Modifying the DNS Table

To view the list of computers stored in the DNS table:

- Access this feature either from the 'Advanced' tab under the 'Services' screen, or by clicking its icon in the 'Advanced' screen. The DNS table will be displayed.

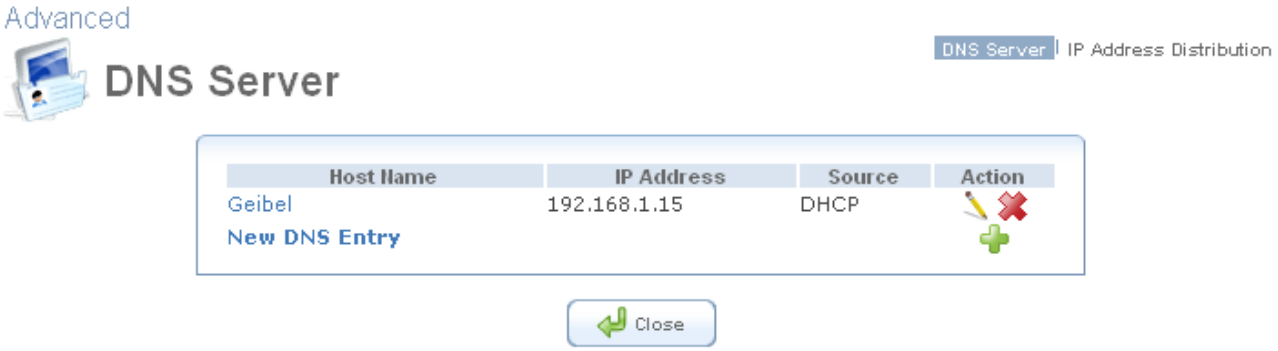


Figure 8-118: DNS Table

To add a new entry to the list:

- Click the 'New DNS Entry' button. The 'DNS Entry' screen will appear.
- Enter the computer's host name and IP address.
- Click 'OK' to save the settings.

To edit the host name or IP address of an entry:

- Click the 'Edit' button that appears in the Action column. The 'DNS Entry' screen appears.
- If the host was manually added to the DNS Table then you may modify its host name and/or IP address, otherwise you may only modify its host name.
- Click 'OK' to save the settings.

To remove a host from the DNS table:

- Click the 'Delete' button that appears in the Action column. The entry will be removed from the table.

8.6.2 IP Address Distribution

Your gateway's Dynamic Host Configuration Protocol (DHCP) server makes it possible to easily add computers that are configured as DHCP clients to the home network. It provides a mechanism for allocating IP addresses and delivering network configuration parameters to such hosts. Watson's default DHCP server is the LAN bridge. A client (host) sends out a broadcast message on the LAN requesting an IP address for itself. The DHCP server then checks its list of available addresses and leases a local IP address to the host for a specific period of time and simultaneously designates this IP address as `taken'. At this point the host is configured with an IP address for the duration of the lease. The host can choose to renew an expiring lease or let it expire. If it chooses to renew a lease then it will also receive current information about network services, as it did with the original lease, allowing it to update its network configurations to reflect any changes that may have occurred since it first connected to the network. If the host wishes to terminate a lease before its expiration it can send a release message to the DHCP server, which will then make the IP address available for use by others.

Your gateway's DHCP server:

- Displays a list of all DHCP host devices connected to Watson
- Defines the range of IP addresses that can be allocated in the LAN
- Defines the length of time for which dynamic IP addresses are allocated
- Can assign a static lease to a LAN PC so that it receives the same IP address each time it connects to the network, even if this IP address is within the range of addresses that the DHCP server may assign to other computers
- Provides the DNS server with the host name and IP address of each PC that is connected to the LAN

Additionally, Watson can act as a DHCP relay, escalating DHCP responsibilities to a WAN DHCP server. In this case, Watson will act merely as a router, while its LAN hosts will receive their IP addresses from a DHCP server on the WAN.

8.6.2.1 DHCP Server Settings

To view a summary of the services currently being provided by the DHCP server, either use its link in the 'Advanced' tab under the 'Services' screen, or click the 'IP Address Distribution' icon in the 'Advanced' screen. The 'IP Address Distribution' screen appears:

Figure 8-119: IP Address Distribution

Note: If a device is listed as 'Disabled' in the 'Service' column, then DHCP services are not being provided to hosts connected to the network through that device. This means that the gateway will not assign IP addresses to these computers, which is useful if you wish to work with static IP addresses only.

To edit the DHCP server settings for a device:

1. Click the device's action icon . The DHCP settings for this device appears:

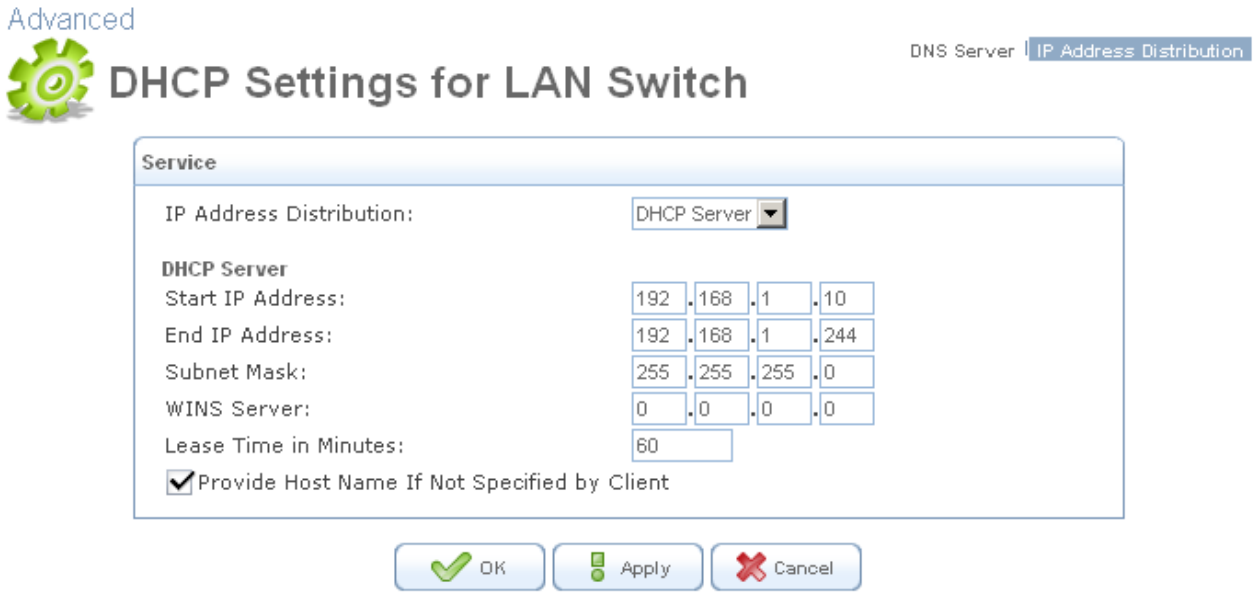


Figure 8-120: DHCP Server Settings for LAN Switch

2. Select the DHCP service:

Disabled Disable the DHCP server for this device.

DHCP Server Enable the DHCP server for this device.

DHCP Relay Set this device to act as a DHCP relay (refer to Section 8.6.2.2).

Assuming you have chosen DHCP Server, complete the following fields:

Start IP Address The first IP address that may be assigned to a LAN host. Since the gateway's default IP address is 192.168.1.1, this address must be 192.168.1.2 or greater.

End IP Address The last IP address in the range that can be used to automatically assign IP addresses to LAN hosts.

Subnet Mask A mask used to determine to what subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.

Lease Time In Minutes Each device will be assigned an IP address by the DHCP server for a this amount of time, when it connects to the network. When the lease expires the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses that are not in use will become available for other computers on the network.

Provide Host Name If Not Specified by Client If the DHCP client does not have a host name, the gateway will automatically assign one for him.

3. Click 'OK' to save the settings.

8.6.2.2 DHCP Relay Settings

To configure a device as a DHCP relay, perform the following steps:

1. Select the 'DHCP Relay' option in the 'IP Address Distribution' combo-box under the Service section (see Figure 8-120). The screen will refresh.

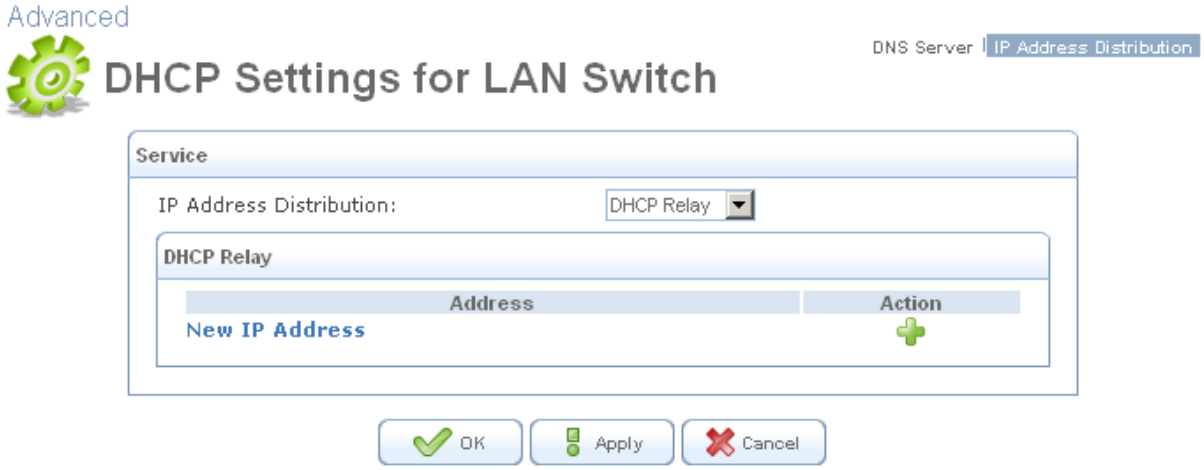


Figure 8-121: DHCP Relay Settings for LAN Switch

2. Click the 'New IP Address' link. The 'DHCP Relay Server Address' screen appears:

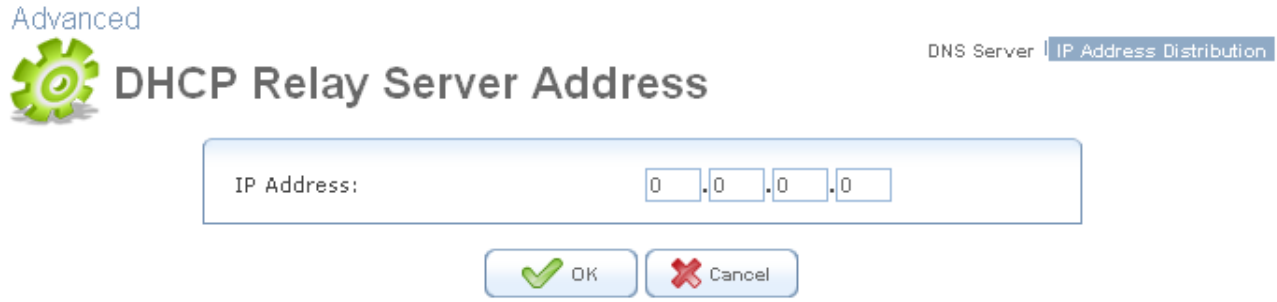


Figure 8-122: DHCP Relay Server Address

3. Specify the IP address of the DHCP server.
4. Click 'OK' to save the settings.
5. Click 'OK' once more in the 'DHCP Settings' screen.
6. Click the 'Network Connections' tab in the 'System' screen. The 'Network Connections' screen appears (see Figure 8-11).
7. Click the 'WAN Ethernet' link. The 'WAN Ethernet Properties' screen appears (see Section 9.4.3).

8. In the 'Routing Mode' combo-box, select "Route". This will change Watson's WAN to work in routing mode, which is necessary in order for DHCP relaying to function properly.

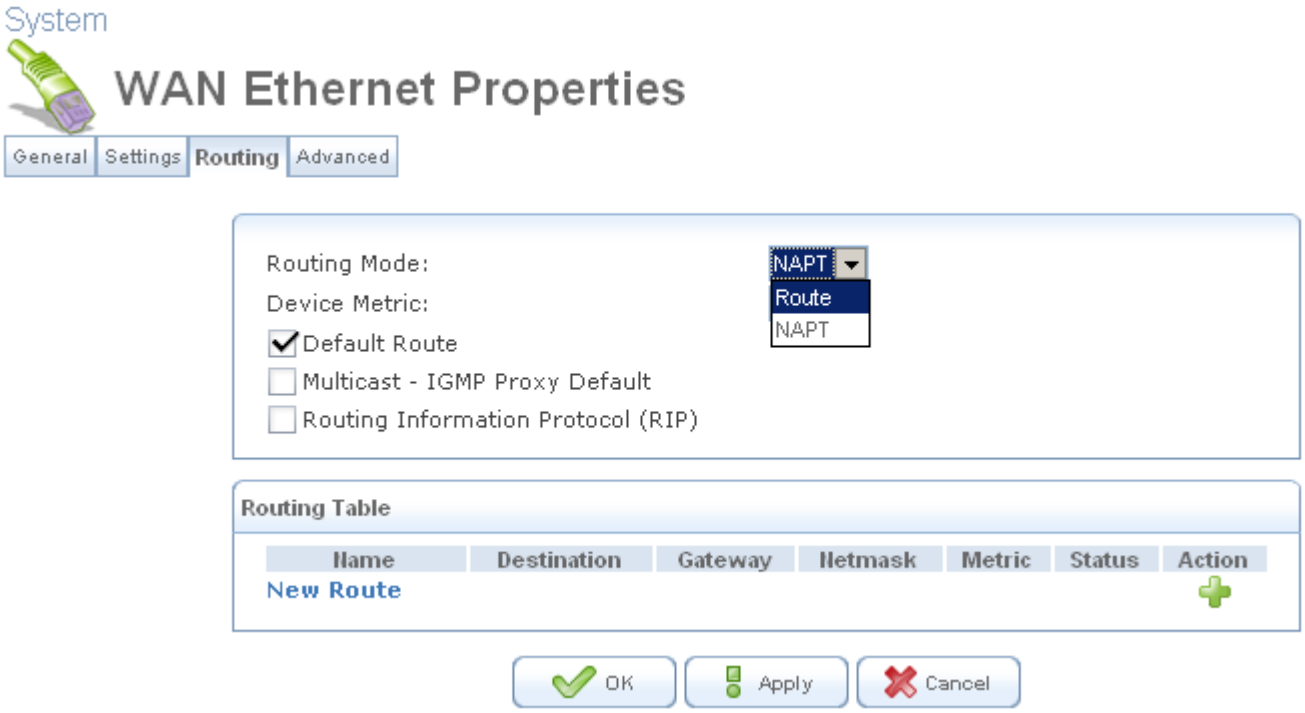


Figure 8-123: Configure WAN Ethernet – Routing

9. Click 'OK' to save the settings.

8.6.2.3 DHCP Connections

To view a list of computers currently recognized by the DHCP server, press the 'Connection List' button that appears at the bottom of the 'IP Address Distribution' screen (see Figure 8-119). The 'DHCP Connections' screen appears:

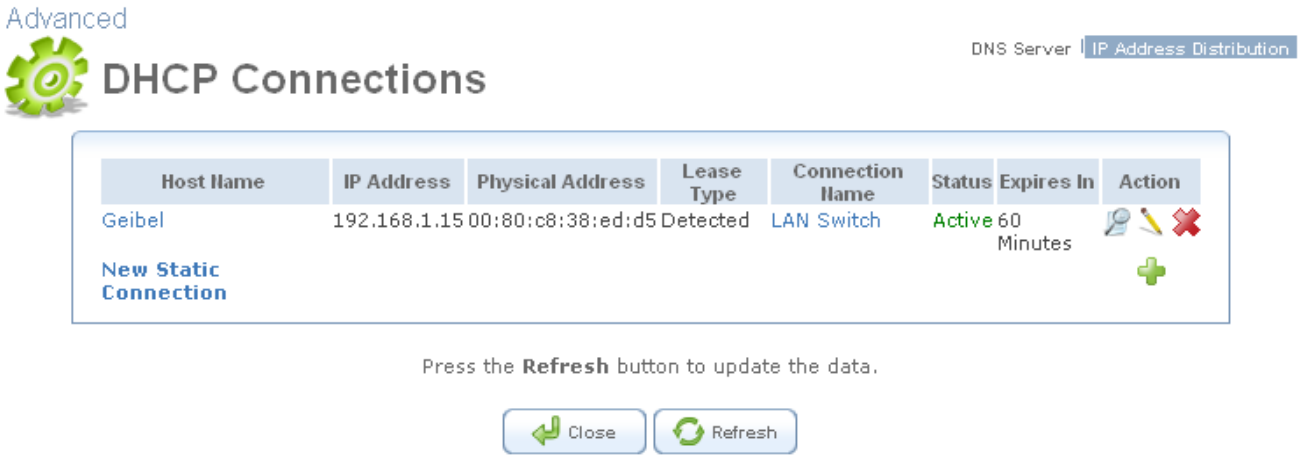


Figure 8-124: DHCP Connections

To define a new connection with a fixed IP address:

1. Click the 'New Static Connection' link. The 'DHCP Connection Settings' screen appears:

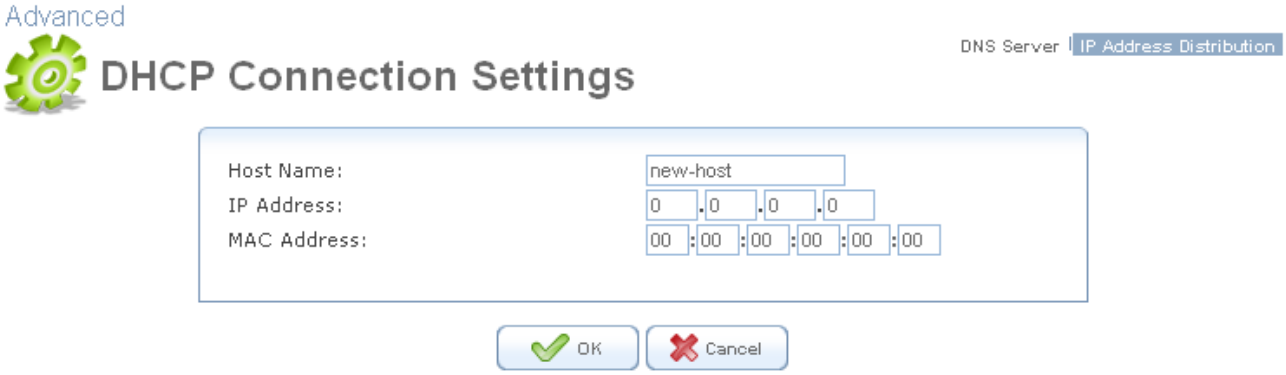


Figure 8-125: DHCP Connection Settings

2. Enter a host name for this connection.
3. Enter the fixed IP address that you would like to have assigned to the computer.
4. Enter the MAC address of the computer's network card.

Note: A device's fixed IP address is actually assigned to the specific network card's (NIC) MAC address installed on the LAN computer. If you replace this network card then you must update the device's entry in the DHCP Connections list with the new network card's MAC address.

5. Click 'OK' to save the settings.

9 System

9.1 Overview

The System 'Overview' screen presents a summary of Watson's system status indication. This includes various details about your Watson product.

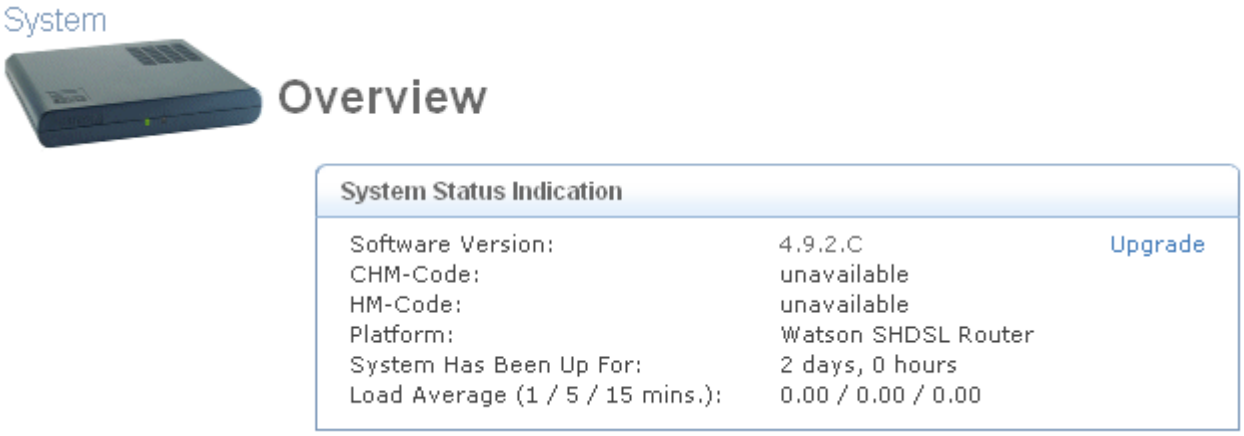

System
Overview
System Status Indication
Software Version: 4.9.2.C Upgrade
CHM-Code: unavailable
HM-Code: unavailable
Platform: Watson SHDSL Router
System Has Been Up For: 2 days, 0 hours
Load Average (1 / 5 / 15 mins.): 0.00 / 0.00 / 0.00

Figure 9-1: System Monitoring Overview

9.2 Settings

9.2.1 Overview

The 'System Settings' screen allows you to configure various system and management parameters:

System Configure general system parameters.

Watson's Hostname Specify the gateway's host name. The host name is the gateway's URL address.

Local Domain Specify your network's local domain.

Watson Management Console Configure Web-based management settings.

Automatic Refresh of System Monitoring Web Pages Select this checkbox to enable the automatic refresh of system monitoring web pages.

Warn User Before Network Configuration Changes Select this checkbox to activate user warnings before network configuration changes take effect.

Session Lifetime The duration of idle time (in seconds) in which the WBM session will remain active. When this duration times out, the user will have to re-login.

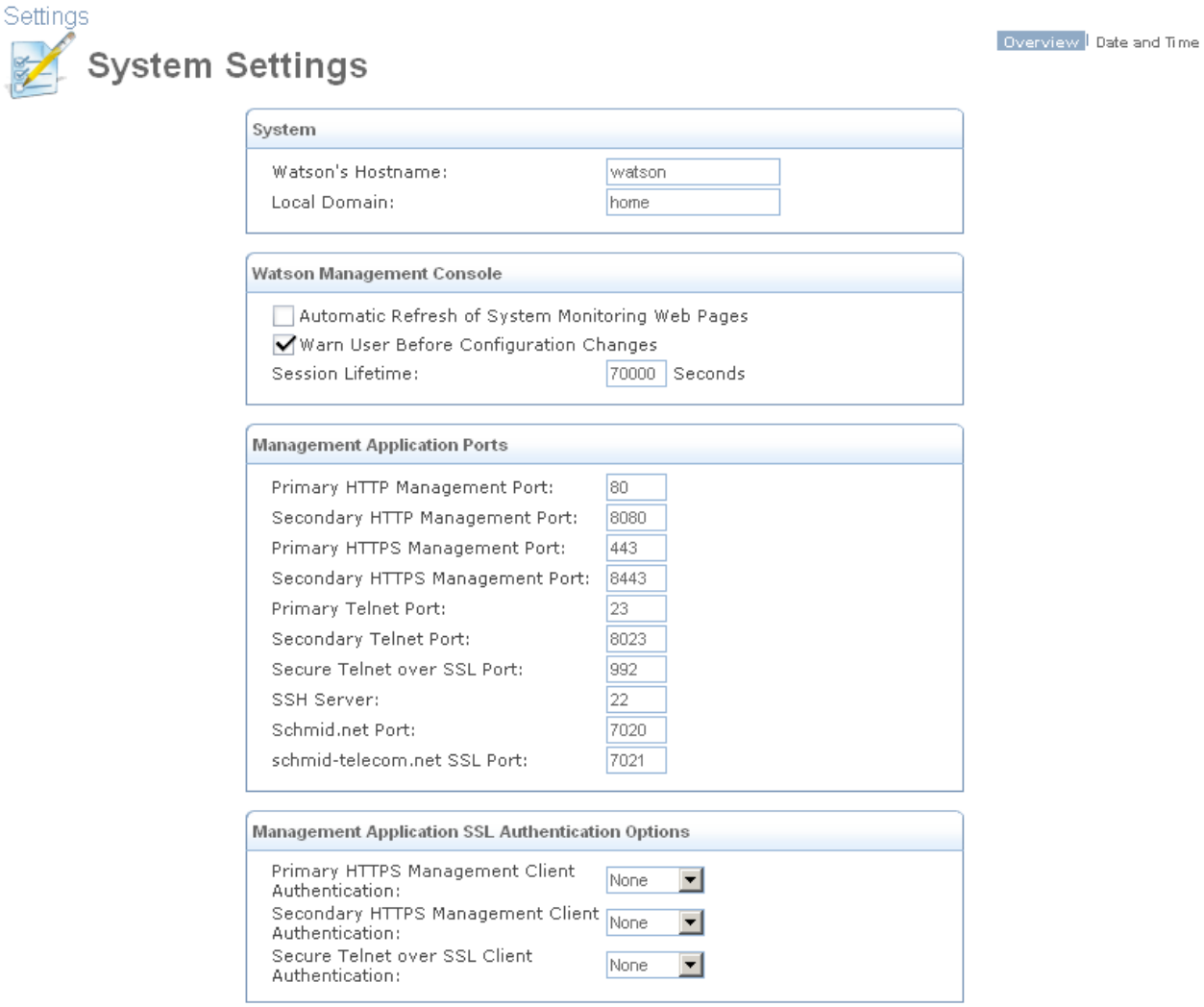


Figure 9-2: System Settings

Management Application Ports Configure the following management application ports:

Primary/secondary HTTP ports

Primary/secondary HTTPS ports

Primary/secondary Telnet ports

Secure Telnet over SSL ports

SSH Server

Management Application SSL Authentication Options Configure the remote client authentication settings, for each of the following Watson management options:

Primary HTTPS Management Client Authentication

Secondary HTTPS Management Client Authentication

Secure Telnet over SSL Client Authentication

The applied authentication settings can be either of the following:

None The client is not authenticated during the SSL connection. Therefore, the client does not need to have a certificate recognized by Watson, which can be used for authentication (for more information about certificates, refer to Section 9.9.4). This is the default setting for all of the mentioned management options.

Required The client is required to have a valid certificate, which is used instead of the regular login procedure. If the client does not have such a certificate, the connection is terminated.

Optional If the client has a valid certificate, it may be used for authentication instead of the regular login procedure. This means that in case of the HTTPS management session, the user, having a valid certificate, directly accesses the 'Network Map' screen of Watson's WBM. In case of the secure Telnet connection, the user, having a valid certificate, directly accesses Watson's CLI prompt. Note that the 'Common Name' (CN) parameter in the Subject field of a client's certificate should contain an existing username, to which administrative permissions are assigned.

System Logging Configure system logging parameters. You can view the system log in the 'System Log' screen under 'Monitor' (refer to Section 9.5.3).

System Log Buffer Size Set the size of the system log buffer in Kilobytes.

Remote System Notify Level The remote system notification level can be one of the following: None, Error, Warning, Information.

Note: If you would like to view Watson's system logs in a host's command prompt, you must first install and run the syslog server.

Persistent System Log Select this check box to save the system log to the Flash –- Watson's permanent memory. This will prevent the system log from being erased when the gateway reboots. Note that by default, this check box is deselected.

Security Logging Configure security logging parameters.

Security Log Buffer Size Set the size of the security log buffer in Kilobytes.

Remote Security Notify Level The remote security notification level can be one of the following: None, Error, Warning, Information.

Persistent Security Log Select this check box to save the security log to the Flash. This will prevent the security log from being erased when the gateway reboots. Note that by default, this check box is deselected.

Note: Do not leave the persistent logging feature enabled permanently, as continuous writing of the log files to the Flash reduces Watson's performance.

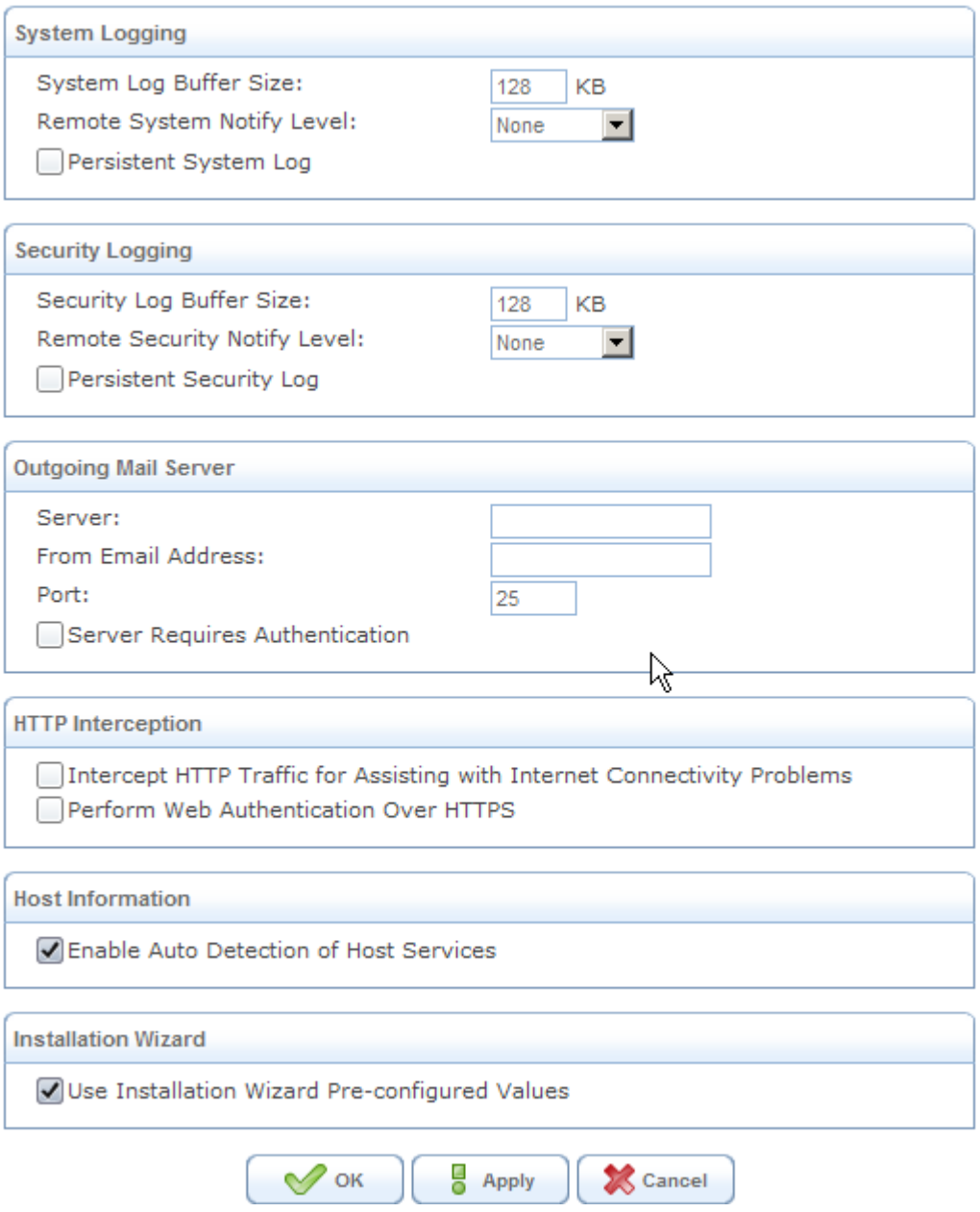


Figure 9-3: System Settings

Outgoing Mail Server Configure outgoing mail server parameters.

Server Enter the hostname of your outgoing (SMTP) server in the 'Server' field.

From Email Address Each email requires a 'from' address and some outgoing servers refuse to forward mail without a valid 'from' address for anti-spam considerations. Enter a 'from' email address in the 'From Email Address' field.

Port Enter the port that is used by your outgoing mail server.

Server Requires Authentication If your outgoing mail server requires authentication check the 'Server Requires Authentication' check-box and enter

your user name and password in the 'User Name' and 'Password' fields respectively.

HTTP Interception

Intercept HTTP Traffic for Assisting with Internet Connectivity Problems If the WAN device is physically disconnected or cannot obtain an up and running status, Watson will display an explanation of the connection's status. This screen is displayed instead of the browser's standard 'The page cannot be displayed' page.

Perform Web Authentication Over HTTPS Select this check box to secure Watson's interception page, in order to protect the required login details. Web authentication will be performed through an HTTPS WBM page.

Host Information Watson can auto-detect its LAN hosts' properties, available services, traffic statistics, and connections (for more information refer to Section 7.1). To enable this feature, select its check box.

Installation Wizard Select the 'Use Installation Wizard Pre-configured Values' check box to have the wizard skip the steps for which parameters had been pre-configured and saved by the factory.

9.2.2 Date and Time

To configure the date, time, and daylight saving settings, perform the following:

1. Click the 'Date and Time' icon in the 'Advanced' screen of the WBM. The 'Date and Time' settings screen is displayed.

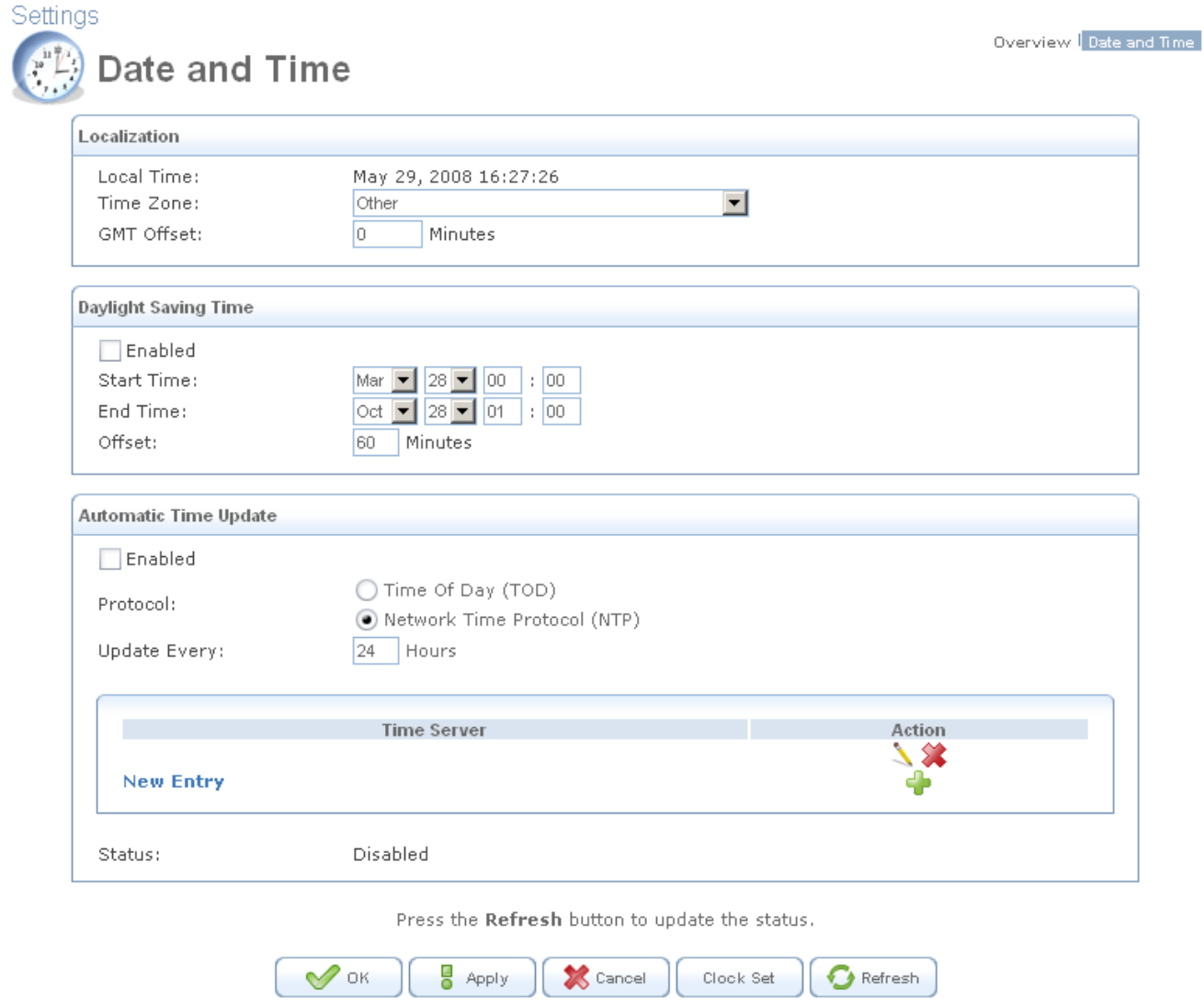


Figure 9-4: Date and Time Settings

2. Select the local time zone from the drop-down menu. Watson can automatically detect daylight saving setting for selected time zones. If the daylight saving settings for your time zone are not automatically detected, the following fields will be displayed:

   Enabled Select this check box to enable daylight saving time.

   Start Date and time when daylight saving starts.

   End Date and time when daylight saving ends.

   Offset Daylight saving time offset.

3. If you want the gateway to perform an automatic time update, proceed as follows:

   a. Select the 'Enabled' check box under the 'Automatic Time Update' section.

   b. Select the protocol to be used to perform the time update by selecting either the 'Time of Day' or 'Network Time Protocol' radio button.

c. In the 'Update Every' field, specify the frequency of performing the update.

d. You can define a time server address by clicking the 'New Entry' link at the bottom of the 'Automatic Time Update' section. You can find a list of time server addresses sorted by region at http://www.pool.ntp.org.

In addition, Watson can function as a Simple Network Time Protocol (SNTP) server, enabling you to automatically update the time settings of your computers from a single but reliable source. By default, Watson's SNTP server is enabled. To synchronize time between the SNTP server and a PC connected to the gateway, perform the following:

1. In the 'Automatic Time Update' section of the 'Date and Time' screen (see Figure 9-4), click the 'Network Time Protocol (NTP)' radio button.
2. Click 'OK' to save the settings.
3. On a Windows XP PC connected to the gateway, perform the following:

   a. In the Control Panel of Windows XP, double-click the 'Date and Time' icon. The 'Date and Time Properties' window appears.

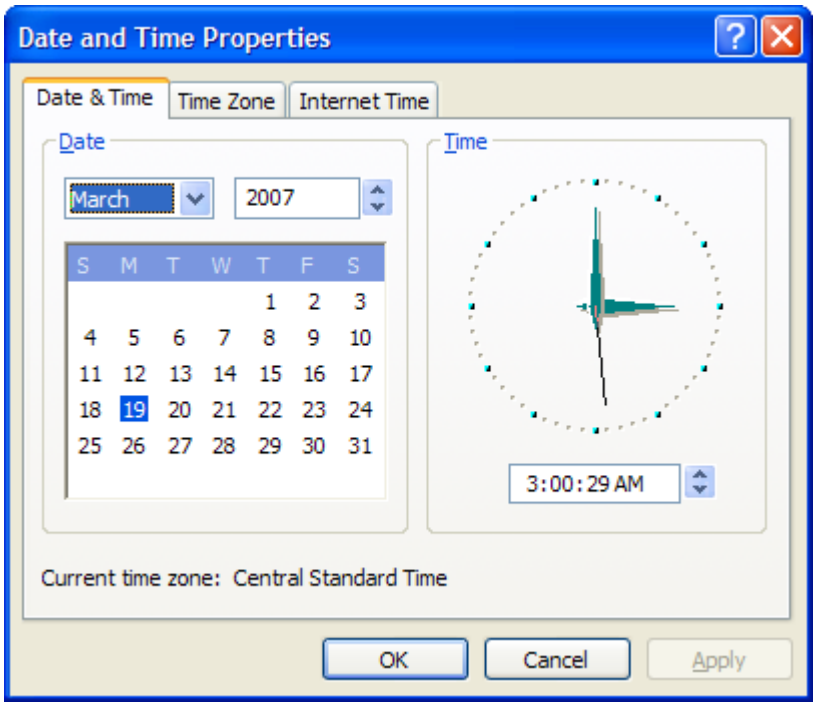


Figure 9-5: Windows–Date and Time Properties

b. Click the 'Internet Time' tab. The window changes to the following.

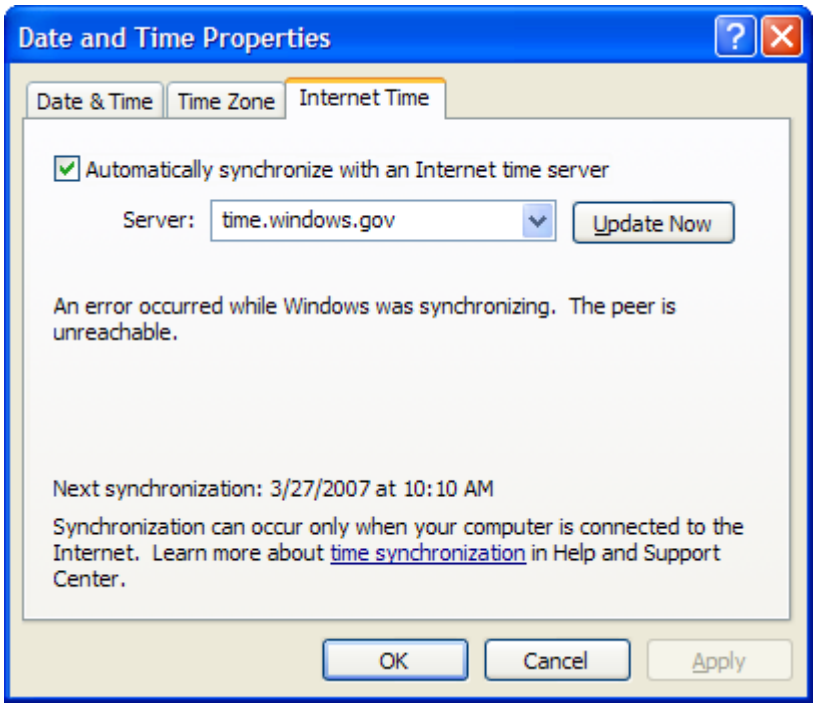

Date and Time Properties
Date & Time
Time Zone
Internet Time
Automatically synchronize with an Internet time server
Server:
time.windows.gov
Update Now
An error occurred while Windows was synchronizing. The peer is unreachable.
Next synchronization: 3/27/2007 at 10:10 AM
Synchronization can occur only when your computer is connected to the Internet. Learn more about time synchronization in Help and Support Center.
OK
Cancel
Apply

Figure 9-6: Windows–Internet Time Screen

c. In the 'Server' field, enter Watson's LAN IP address (The default one is 192.168.1.1).

d. Click 'Update Now'. Windows will synchronize with Watson's SNTP server. In addition, Windows will perform a periodical synchronization with the SNTP server.

e. Click 'OK' to save the settings.

9.3 Users

The 'Users' screen lists the currently defined users and provides a link to add new users. You may also group users according to your preferences. This screen can also be accessed by clicking the 'Users' icon in the 'Advanced' screen. The "Administrator" is a default user provided by the system.

Figure 9-7: Users

9.3.1 User Settings

To add a new user, click the 'New User' link. The 'User Settings' screen appears.

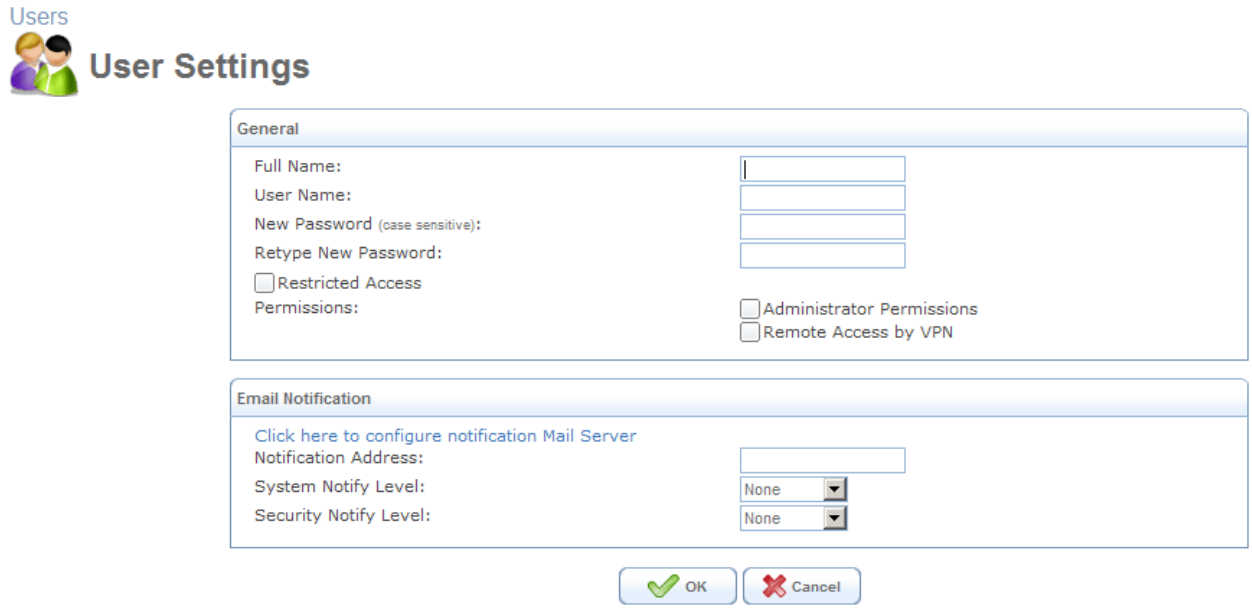


Figure 9-8: User Settings

9.3.1.1 General

Full Name The remote user's full name.

User Name The name that a user will use to access your network.

New Password The user's password.

Retype New Password If a new password is assigned, type it again to verify its correctness.

Restricted Access Select this check box if you would like the WBM to appear in its basic mode, when logging in with this user. Only the basic Watson features and parameters will be displayed. When enabling this option for the user that is currently logged in, the system will require re-login to apply the new WBM settings

Permissions Select the user's privileges.

Administrator Permissions Grants permissions to remotely modify system setting via Web-based management or Telnet.

Remote Access by VPN Grants remote access to Watson using the VPN protocol.

9.3.1.2 E-Mail Notification

You can use email notification to receive indications of system events for a predefined severity classification. The available types of events are 'System' or 'Security' events. The available severity of events are 'Error', 'Warning' and 'Information'. If the 'Information' level is selected the user will receive notification of 'Information',

'Warning' and 'Error' events. If the 'Warning' level is selected the user will receive notification of 'Warning' and 'Error' events etc. To configure email notification for a specific user:

- First make sure you have configured an outgoing mail server in 'System Settings'. A click on the 'Configure Mail Server' link will display the 'System Settings' page were you can configure the outgoing mail server.
- Enter the user's email address in the 'Address' field in the 'Email' section.
- Select the 'System' and 'Security' notification levels in the 'System Notify Level' and 'Security Notify Level' combo boxes respectively.

9.3.2 Group Settings

You may assemble your defined users into different groups, based on different criteria – for example, home users versus office users. By default, new users will be added to the default group "Users". To add a new group, click the 'New Group' link. The 'Group Settings' screen will appear.

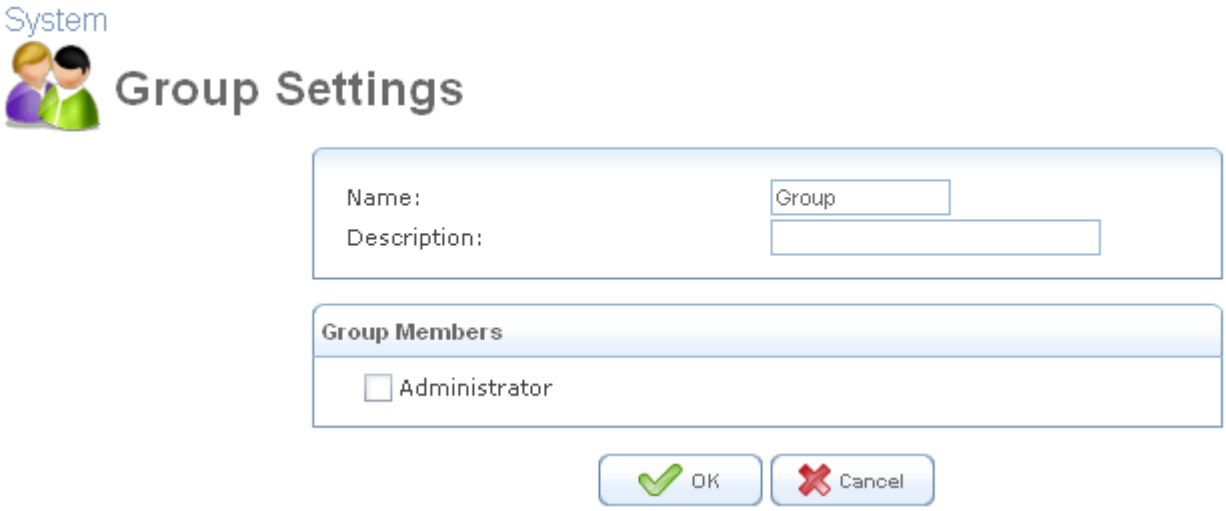


Figure 9-9: Group Settings

Name Enter a name for the group of users.

Description You may also enter a short description for the group.

Group Members Select the users that will belong to this group. All users defined are presented in this section. A user can belong to more than one group.

9.4 Network Connections

Watson supports various network connections, both physical and logical. The Network Connections screen enables you to configure the various parameters of your physical connections, the LAN and WAN, and create new connections, using tunneling protocols over existing connections, such as PPP and VPN. When clicking the 'Network Connections' icon on the sidebar for the first time, the following typical screen appears:

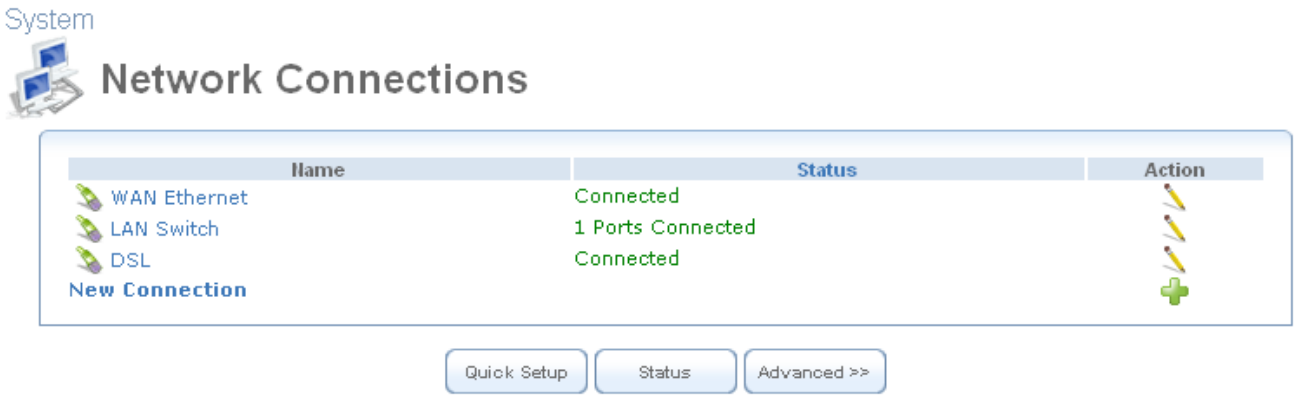


Figure 9-10: Network Connections - Basic

Press the 'Advanced' button to expand the screen and display all connection entries.

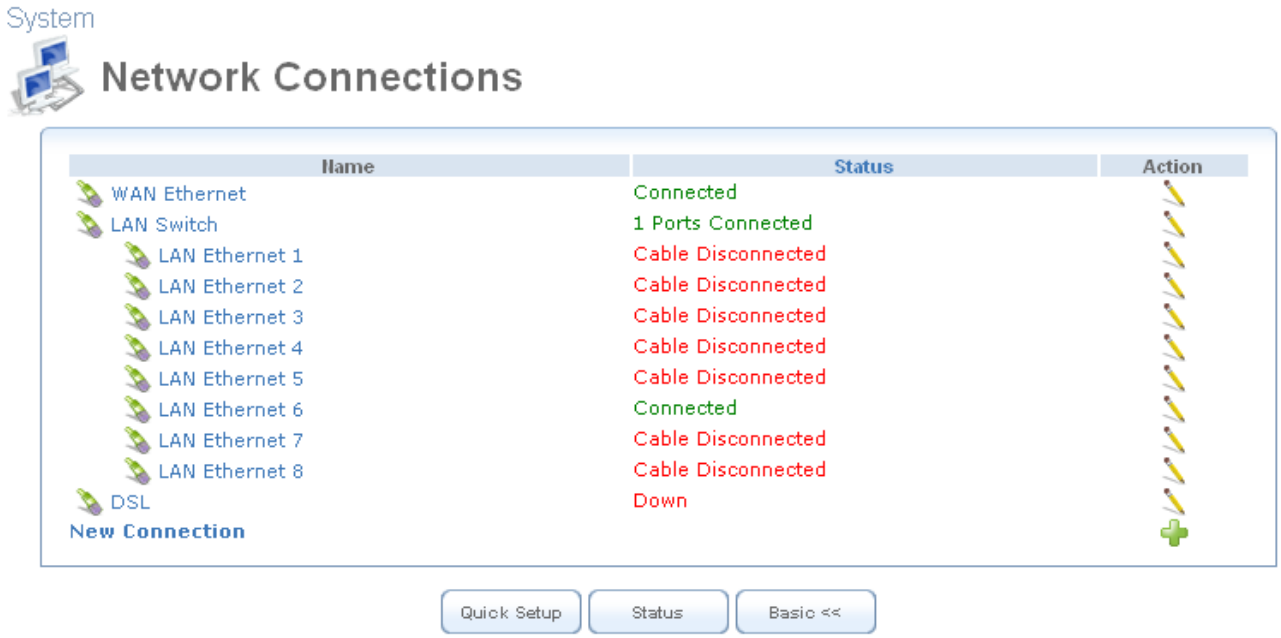


Figure 9-11: Network Connections - Advanced

This chapter describes the different network connections available with Watson, as well as the connection types that you can create using the Connection Wizard.

Watson's default network connections are:

WAN Ethernet (refer to Section 9.4.3).

LAN Switch (refer to Section 9.4.4).

LAN Ethernet (refer to Section 9.4.5).

DSL (refer to Section 9.4.6).

The logical network connections available with Watson are:

WAN - Internet Connection

DHCP - Dynamic Host Configuration Protocol (refer to Section 9.4.7).

Manual - IP Address Configuration (refer to Section 9.4.8).

PPPoE - Point-to-Point Protocol over Ethernet (refer to Section 9.4.9).

Virtual Private Network over the Internet

PPTP - Point-to-Point Tunneling Protocol (refer to Section 9.4.12).

PPTP Server - Point-to-Point Tunneling Protocol Server (refer to Section 9.4.13).

IPSec - Internet Protocol Security (refer to Section 9.4.14).

IPSec Server - Internet Protocol Security Server (refer to Section 9.4.15).

Advanced Connections

Network Bridging (refer to Section 9.4.10).

VLAN Interface (refer to Section 9.4.11).

IPIP - Internet Protocol over Internet Protocol (refer to Section 9.4.16).

GRE - General Routing Encapsulation (refer to Section 9.4.17).

9.4.1 The Connection Wizard

The logical network connections can be easily created using the Connection Wizard. This wizard is consisted of a series of Web-based management screens, intuitively structured to gather all the information needed to create a logical connention.

In order to create a connection on your gateway using the wizard, click the 'New Connection' link in the Network Connections screen. The 'Connection Wizard' screen will appear.

System
Connection Wizard
Choose the type of network connection you want to create, based on your network configuration and your networking needs.
Internet Connection
Connect to the Internet using your DSL connection so you can browse the Web and read email.
Connect to a Virtual Private Network over the Internet
Connect Watson to a business network using a Virtual Private Network (VPN) so you can work from home, workplace or another location.
Advanced Connection
Manually configure a new connection.
Next
Cancel

Figure 9-12: Connection Wizard

This screen presents you with the main connection types. Each option that you choose will lead you to further options in a tree-like formation, adding more information with each step and narrowing down the parameters towards the desired network connection.

- Internet Connection Selecting this option will take you to the 'Internet Connection' screen. This section of the wizard will help you set up your Internet connection, in one of the various methods available.

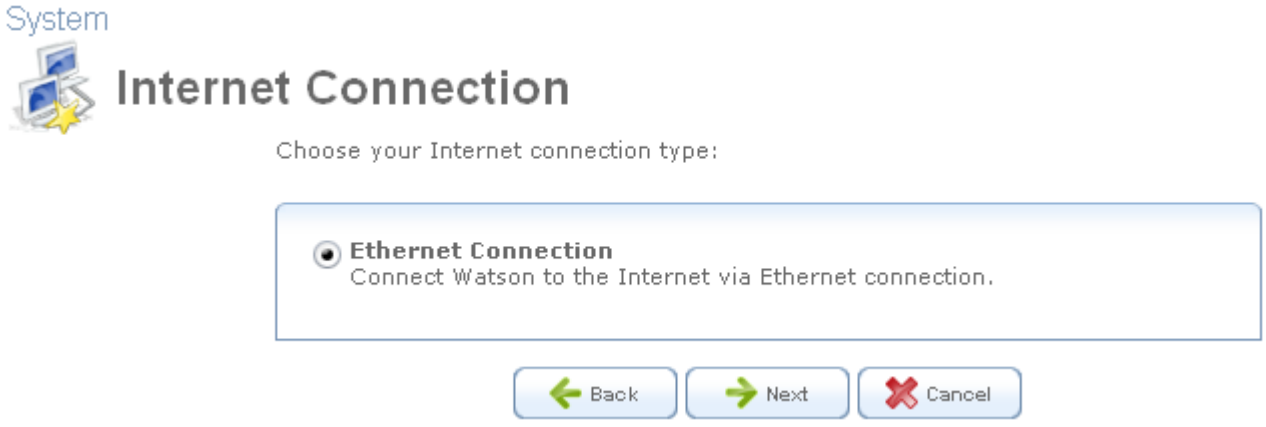


Figure 9-13: Internet Connection Wizard Screen

- Connect to a Virtual Private Network over the Internet Selecting this option will take you to the 'Connect to a Virtual Private Network over the Internet' screen. This section will help you connect Watson to a business network using a Virtual Private Network (VPN) so you can work from home, your workplace or another location.

System
Connect to a Virtual Private Network over the Internet
Choose your VPN connection type:
VPN Client or Point-To-Point
Connect to your business network from home or another location, using a Virtual Private Network (VPN) over the Internet.
VPN Server
Enable Virtual Private Network (VPN) connections to Watson from other locations.
Back
Next
Cancel

Figure 9-14: VPN Wizard Screen

- Advanced Connection Selecting this option will take you to the 'Advanced Connection' screen. This section is a central starting point for all the aforementioned logical network connections. In addition, it provides the sequence for creating the Network Bridge and VLAN Interface connections.

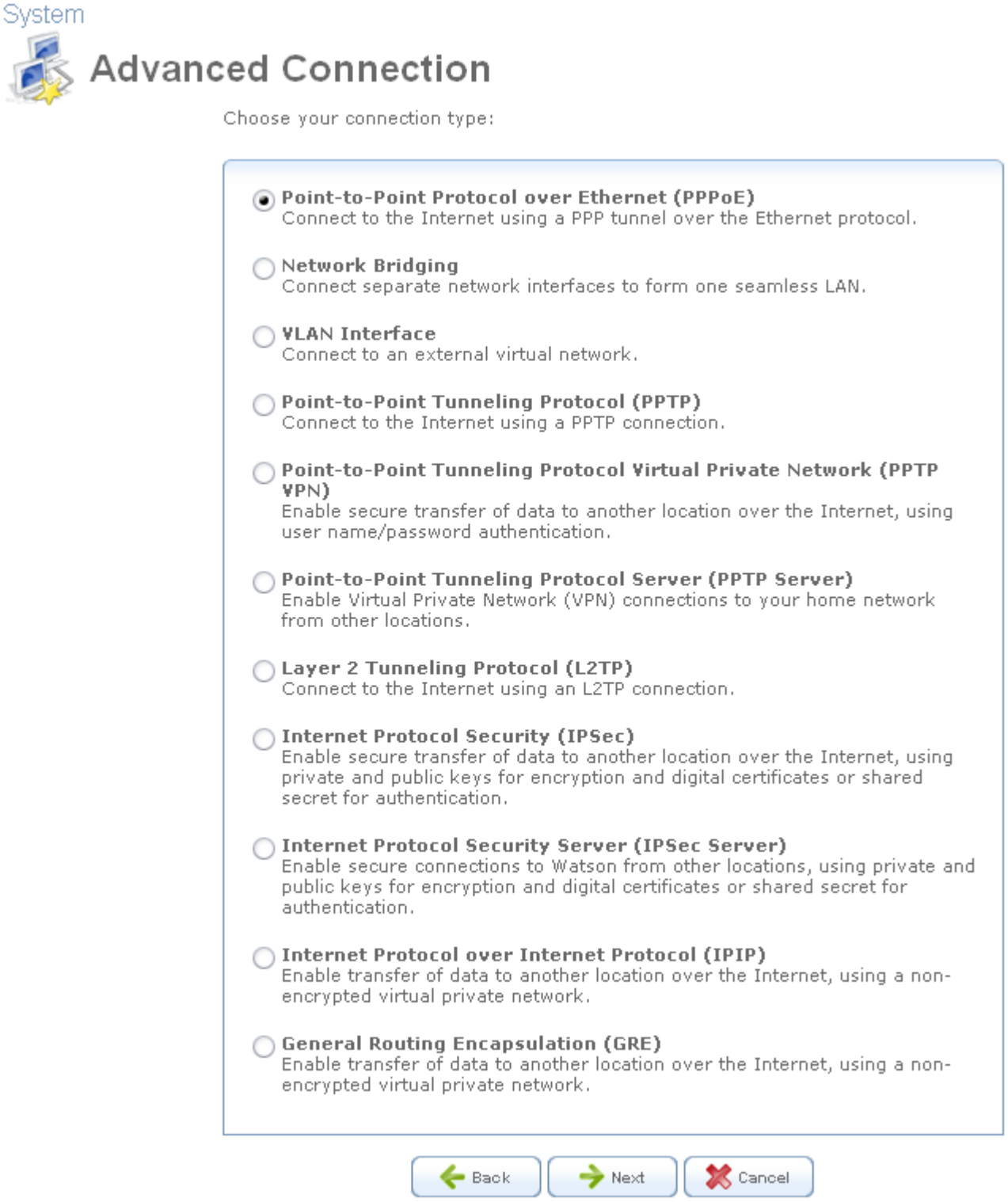

System
Advanced Connection
Choose your connection type:
Point-to-Point Protocol over Ethernet (PPPoE)
Connect to the Internet using a PPP tunnel over the Ethernet protocol.
Network Bridging
Connect separate network interfaces to form one seamless LAN.
VLAN Interface
Connect to an external virtual network.
Point-to-Point Tunneling Protocol (PPTP)
Connect to the Internet using a PPTP connection.
Point-to-Point Tunneling Protocol Virtual Private Network (PPTP VPN)
Enable secure transfer of data to another location over the Internet, using user name/password authentication.
Point-to-Point Tunneling Protocol Server (PPTP Server)
Enable Virtual Private Network (VPN) connections to your home network from other locations.
Layer 2 Tunneling Protocol (L2TP)
Connect to the Internet using an L2TP connection.
Internet Protocol Security (IPSec)
Enable secure transfer of data to another location over the Internet, using private and public keys for encryption and digital certificates or shared secret for authentication.
Internet Protocol Security Server (IPSec Server)
Enable secure connections to Watson from other locations, using private and public keys for encryption and digital certificates or shared secret for authentication.
Internet Protocol over Internet Protocol (IPIP)
Enable transfer of data to another location over the Internet, using a non-encrypted virtual private network.
General Routing Encapsulation (GRE)
Enable transfer of data to another location over the Internet, using a non-encrypted virtual private network.
Back
Next
Cancel

Figure 9-15: Advanced Connection Wizard Screen

Each logical connection described later in this chapter will include the "route" needed to be taken through the Connection Wizard in order for the connection to be created.

9.4.2 Network Types

Every network connection in Watson can be configured as one of three types: WAN, LAN or DMZ. This provides high flexibility and increased functionality. For example, a network connection can be defined as a DMZ (Demilitarized) network. Although the network is physically inside Watson, it will function as an unsecured, independent network, for which Watson merely acts as a router. One of these three network types is defined in each connection's configuration screen, in the 'Network' combo-box, as depicted in the following sections.

9.4.2.1 DMZ Network

When defining a network connection as a DMZ network, you must also:

- Remove the connection from under a bridge, if that is the case.
- Change the connection's routing mode to "Route", in the 'Routing' section of the configuration screen.

9.4.3 WAN Ethernet

The WAN Ethernet connection can connect Watson DSL modem to another network The Connection Wizard provides two methods to quickly configure this connection, described later in this chapter:

- Dynamic Host Configuration Protocol (refer to Section 9.4.7).
- Manual IP Address Configuration (refer to Section 9.4.8).

9.4.3.1 General

To view and edit the WAN Ethernet connection settings, click the 'WAN Ethernet' link in the 'Network Connections' screen (see Figure 9-11). The 'WAN Ethernet Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

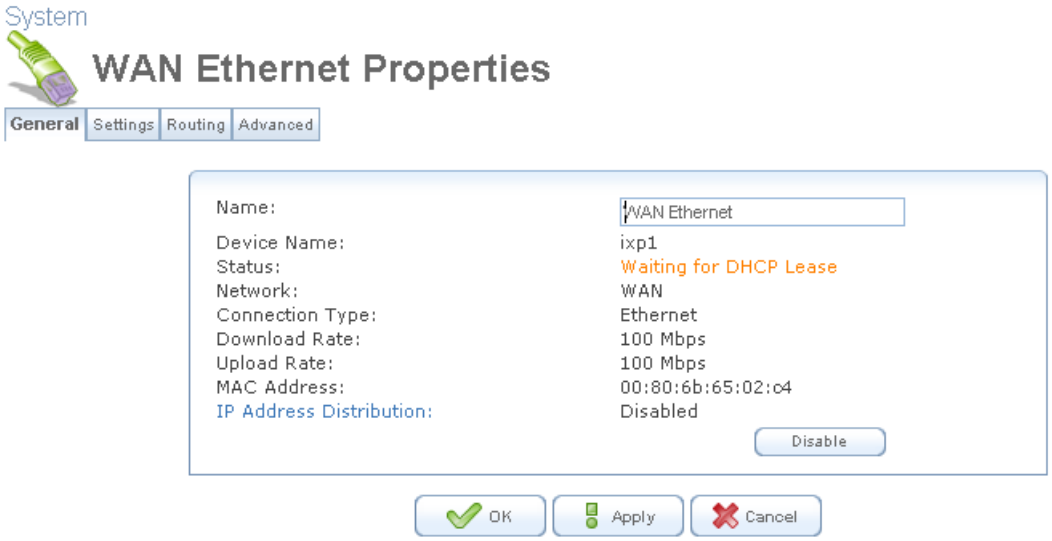


Figure 9-16: WAN Ethernet Properties – General

9.4.3.2 Settings

This section displays the connection's general parameters. It is recommended not to change the default values unless familiar with the networking concepts they represent. Since your gateway is configured to operate with the default values, no parameter modification is necessary.

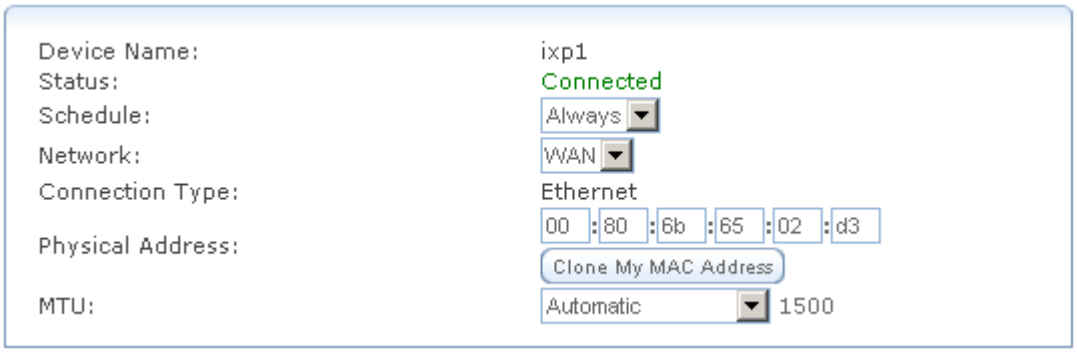


Figure 9-17: WAN Ethernet Properties - Settings

Status The connection status should always show ‘Connected’, because the WAN Ethernet interface is always connected to the inernal DSL modem.

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the con-

nection may be active. Once a scheduler rule(s) is defined, the drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

Physical Address The physical address of the network card used for your network.

Clone My MAC Address Press this button to copy your PC's current MAC address to Watson.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic by DHCP' to have the DHCP determine the MTU. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' drop-down menu:

- No IP Address
- Obtain an IP Address Automatically
- Use the Following IP Address

Note that the screen will refresh to display relevant configuration settings according to your choice.

No IP Address Select 'No IP Address' if you require that your gateway have no IP address. This can be useful if you are working in an environment where you are not connected to other networks, such as the Internet.

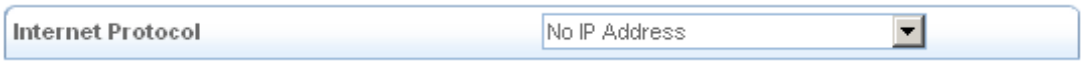


Figure 9-18: Internet Protocol – No IP Address

Obtain an IP Address Automatically Your connection is configured by default to act as a DHCP client. You should keep this configuration in case your service provider supports DHCP, or if you are connecting using a dynamic IP address. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead. You can click the 'Release' button to release the current leased IP address. Once the address has been released, the button text changes to 'Renew'. Use the 'Renew' button to renew the leased IP address.

Figure 9-19: Internet Protocol Settings – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

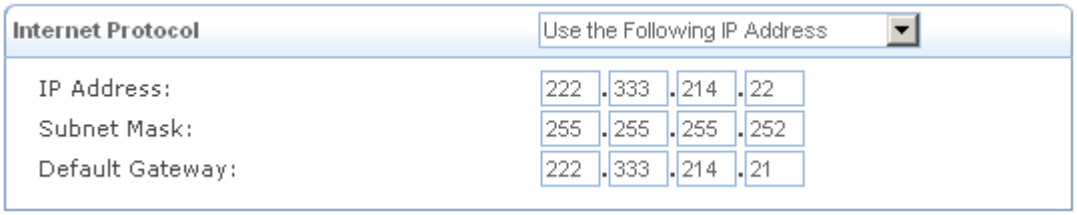

Internet Protocol
Use the Following IP Address
IP Address:
222 . 333 . 214 . 22
Subnet Mask:
255 . 255 . 255 . 252
Default Gateway:
222 . 333 . 214 . 21

Figure 9-20: Internet Protocol – Static IP

DNS Server Domain Name System (DNS) is the method by which Web site domain names are translated into IP addresses. You can configure the connection to automatically obtain a DNS server address, or specify such an address manually, according to the information provided by your ISP. To configure the connection to automatically obtain a DNS server address, select 'Obtain DNS Server Address Automatically' from the 'DNS Server' drop down menu.

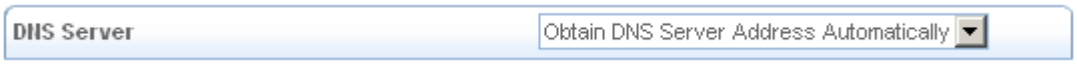


Figure 9-21: DNS Server – Automatic IP

To manually configure DNS server addresses, select 'Use the Following DNS Server Addresses' from the 'DNS Server' drop down menu (see Figure 9-22). Specify up to two different DNS server address, one primary, another secondary.

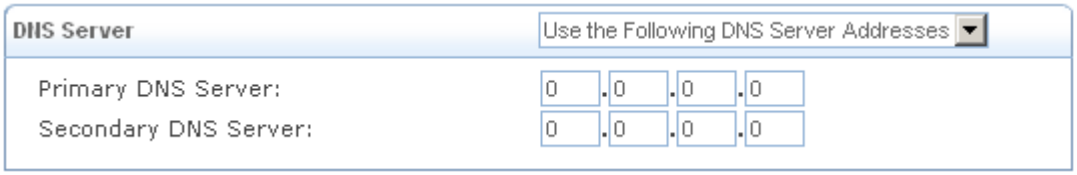


Figure 9-22: DNS Server – Static IP

To learn more about this feature, refer to Section 8.6.1.

IP Address Distribution The 'IP Address Distribution' section allows you to configure the gateway's Dynamic Host Configuration Protocol (DHCP) server parameters. The DHCP automatically assigns IP addresses to network PCs. If you enable this feature, make sure that you also configure your network PCs as DHCP clients. For a comprehensive description of this feature, please refer to Section 8.6.2. Select one of the following options from the 'IP Address Distribution' combo-box:

- **DHCP Server**

  Start IP Address The first IP address that may be assigned to a LAN host. Since the gateway's default IP address is 192.168.1.1, this address must be 192.168.1.2 or greater.

  End IP Address The last IP address in the range that can be used to automatically assign IP addresses to LAN hosts.

Subnet Mask A mask used to determine to what subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.

Lease Time In Minutes Each device will be assigned an IP address by the DHCP server for a this amount of time, when it connects to the network. When the lease expires the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses that are not in use will become available for other computers on the network.

Provide Host Name If Not Specified by Client If the DHCP client does not have a host name, the gateway will automatically assign one for him.

Click 'OK' to save the settings.

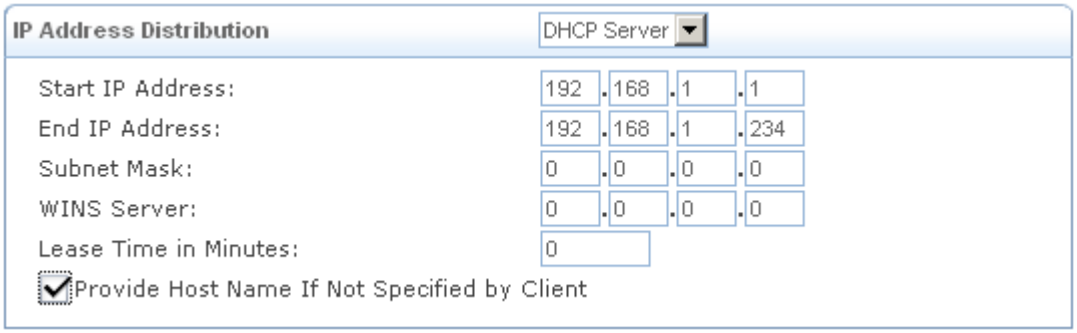

IP Address Distribution
DHCP Server
Start IP Address:
192 . 168 . 1 . 1
End IP Address:
192 . 168 . 1 . 234
Subnet Mask:
0 . 0 . 0 . 0
WINS Server:
0 . 0 . 0 . 0
Lease Time in Minutes:
0
Provide Host Name If Not Specified by Client

Figure 9-23: IP Address Distribution - DHCP Server

- **DHCP Relay** – Your gateway can act as a DHCP relay in case you would like to dynamically assign IP addresses from a DHCP server other than your gateway's DHCP server. Note that when selecting this option you must also change Watson's WAN to work in routing mode. For more information, refer to Section 8.6.2.2.

After selecting 'DHCP Relay' from the drop down menu, a 'New IP Address' link will appear:

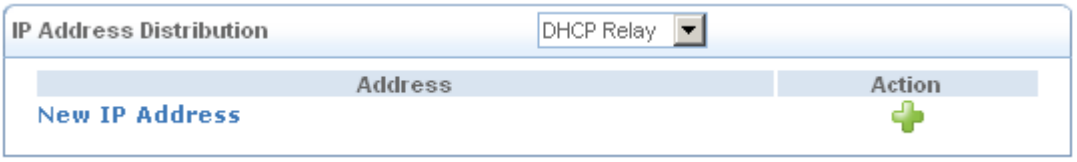


Figure 9-24: IP Address Distribution - DHCP Relay

Click the 'New IP Address' link. The 'DHCP Relay Server Address' screen will appear:

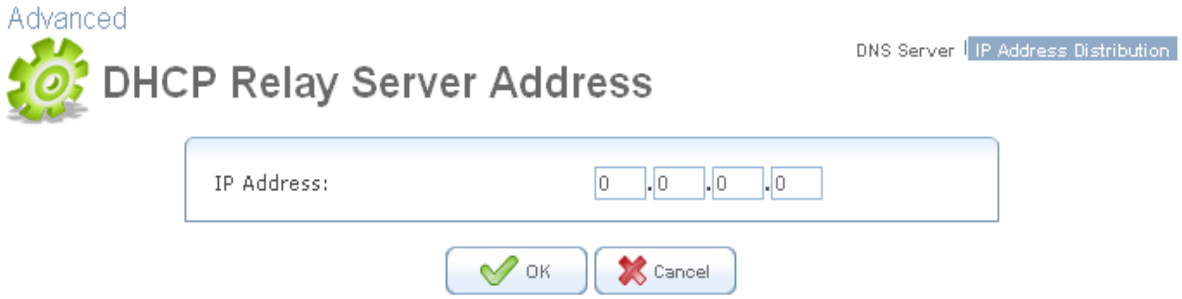


Figure 9-25: DHCP Relay Server Address

Specify the IP address of the DHCP server.

Click 'OK' to save the settings.

- **Disabled** – Select 'Disabled' from the combo-box if you do not want to assign IP addresses to the WAN. This is the standard setting for the WAN interface.

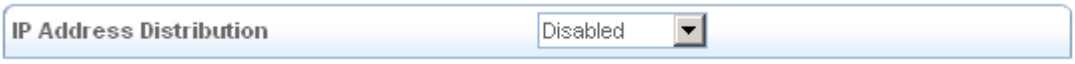


Figure 9-26: IP Address Distribution - Disable DHCP

9.4.3.3 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
- **NAPT** Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses multiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

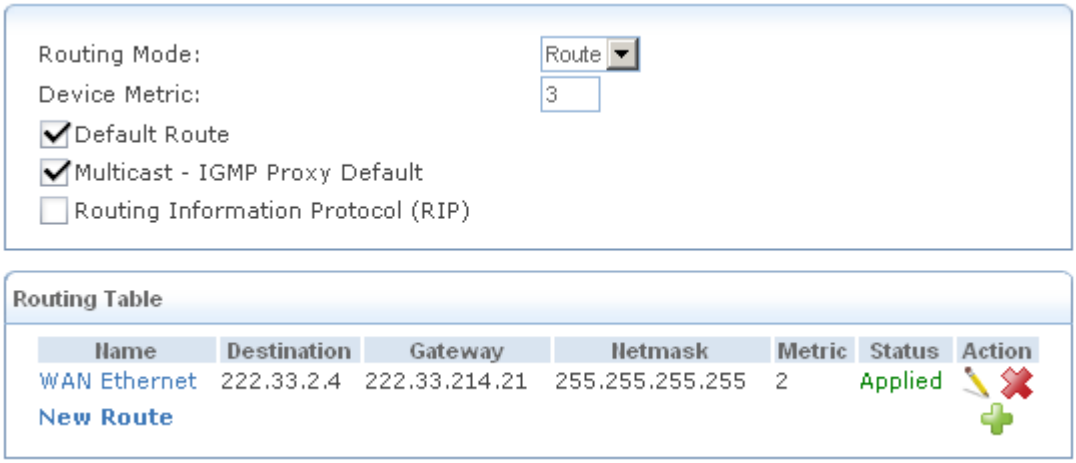


Figure 9-27: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.3.4 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

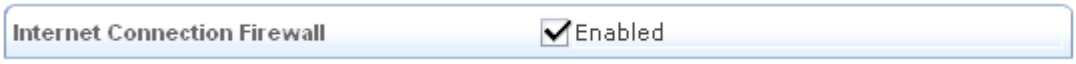


Figure 9-28: Internet Connection Firewall

Additional IP Addresses You can add alias names (additional IP addresses) to the gateway by clicking the 'New IP Address' link. This enables you to access the gateway using these aliases in addition to the 192.168.1.1 .

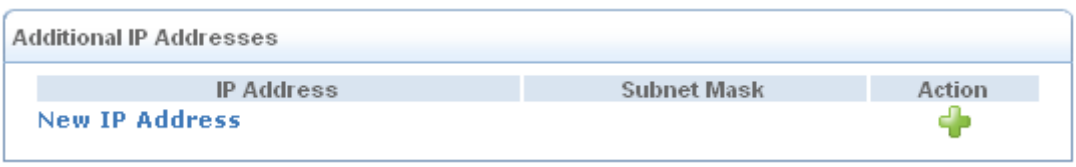


Figure 9-29: Additional IP Addresses

9.4.4 LAN Switch

The LAN Switch interface represents Watson's integrated Ethernet Switch.

9.4.4.1 General

To view and edit the LAN Switch settings, click the 'LAN Switch' link in the 'Network Connections' screen (see Figure 9-11). The 'LAN Switch Properties' screen appears, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

Figure 9-30: LAN Switch Properties – General

9.4.4.2 Settings

This section displays the connection's general parameters. It is recommended not to change the default values unless familiar with the networking concepts they represent. Since your gateway is configured to operate with the default values, no parameter modification is necessary.

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

Physical Address The physical address of the network card used for your network. Some cards allow you to change this address.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic by DHCP' to have the DHCP determine the MTU. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

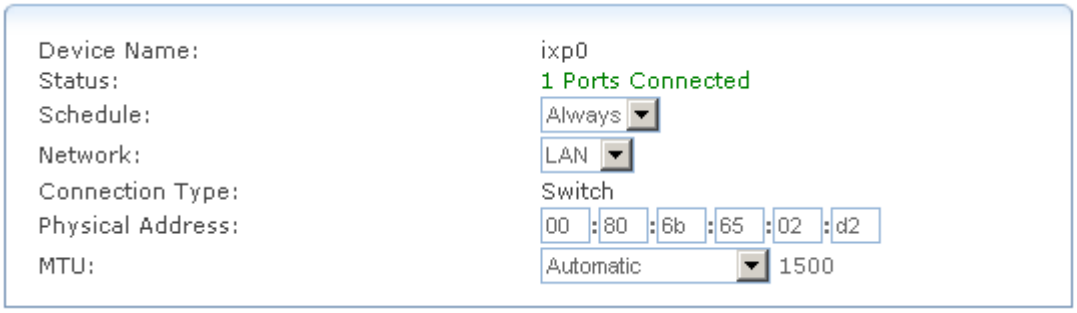


Figure 9-31: LAN Switch Properties - Settings

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' drop-down menu:

- No IP Address
- Obtain an IP Address Automatically
- Use the Following IP Address

Note that the screen will refresh to display relevant configuration settings according to your choice.

No IP Address Select 'No IP Address' if you require that your gateway have no IP address. This can be useful if you are working in an environment where you are not connected to other networks, such as the Internet.

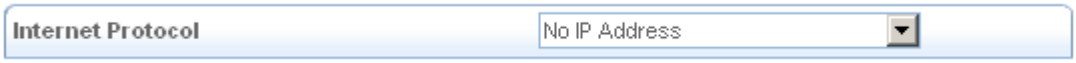


Figure 9-32: Internet Protocol – No IP Address

Obtain an IP Address Automatically You can configure your connection to act as a DHCP client if you have a DHCP server in your network. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead. You can click the 'Release' button to release the current leased IP address. Once the address has been released, the button text changes to 'Renew'. Use the 'Renew' button to renew the leased IP address.

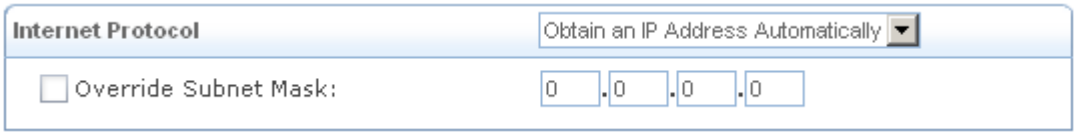


Figure 9-33: Internet Protocol Settings – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

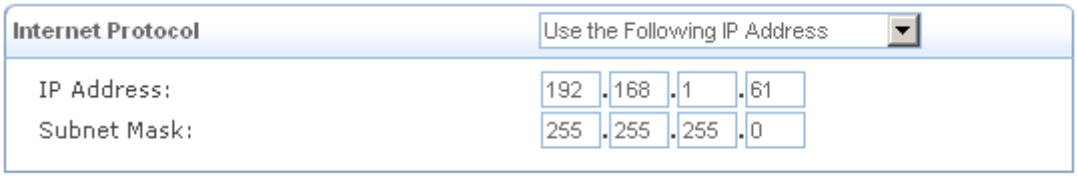


Figure 9-34: Internet Protocol – Static IP

DNS Server Domain Name System (DNS) is the method by which Web site domain names are translated into IP addresses. You can configure the connection to automatically obtain a DNS server address, or specify such an address manually. To configure the connection to automatically obtain a DNS server address, select 'Obtain DNS Server Address Automatically' from the 'DNS Server' drop down menu.

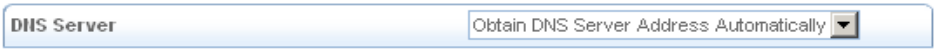


Figure 9-35: DNS Server – Automatic IP

To manually configure DNS server addresses, select 'Use the Following DNS Server Addresses' from the 'DNS Server' drop down menu. Specify up to two different DNS server address, one primary, another secondary.

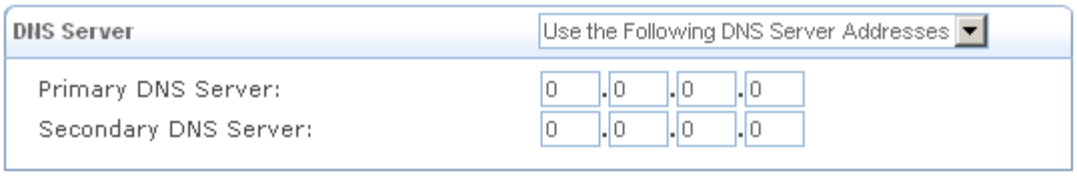


Figure 9-36: DNS Server – Static IP

To learn more about this feature, refer to Section 8.6.1.

IP Address Distribution The 'IP Address Distribution' section allows you to configure the gateway's Dynamic Host Configuration Protocol (DHCP) server parameters. The DHCP automatically assigns IP addresses to network PCs. If you enable this feature, make sure that you also configure your network PCs as DHCP clients. For a comprehensive description of this feature, please refer to Section 8.6.2. Select one of the following options from the 'IP Address Distribution' combo-box:

- **DHCP Server**

  Start IP Address The first IP address that may be assigned to a LAN host. If you use 192.168.1.1 as gateway's IP address, the start IP address must be 192.168.1.2 or greater.

  End IP Address The last IP address in the range that can be used to automatically assign IP addresses to LAN hosts.

Subnet Mask A mask used to determine to what subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.

Lease Time In Minutes Each device will be assigned an IP address by the DHCP server for a this amount of time, when it connects to the network. When the lease expires the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses that are not in use will become available for other computers on the network.

Provide Host Name If Not Specified by Client If the DHCP client does not have a host name, the gateway will automatically assign one for him.

Click 'OK' to save the settings.

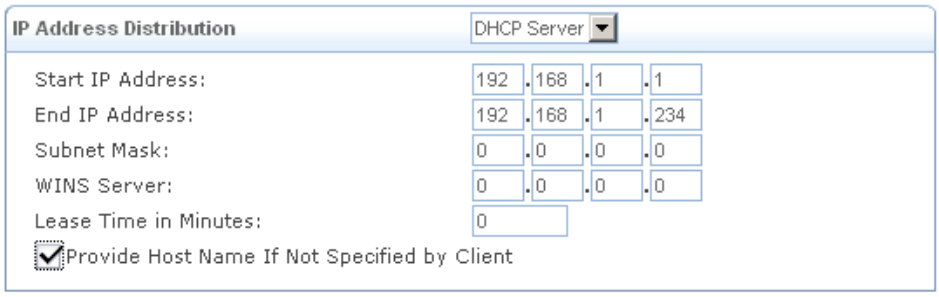


Figure 9-37: IP Address Distribution – DHCP Server

- **DHCP Relay** - Your gateway can act as a DHCP relay in case you would like to dynamically assign IP addresses from a DHCP server other than your gateway's DHCP server. Note that when selecting this option you must also change Watson's WAN to work in routing mode. For more information, refer to Section 8.6.2.2.

After selecting 'DHCP Relay' from the drop down menu, a 'New IP Address' link will appear:

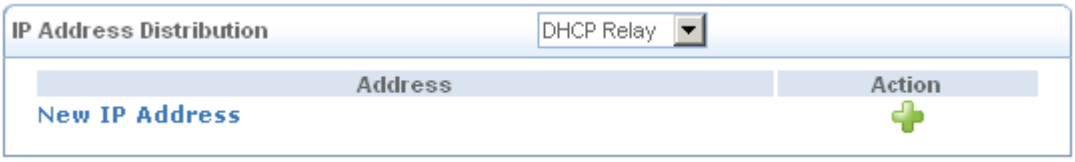


Figure 9-38: IP Address Distribution – DHCP Relay

Click the 'New IP Address' link. The 'DHCP Relay Server Address' screen will appear:

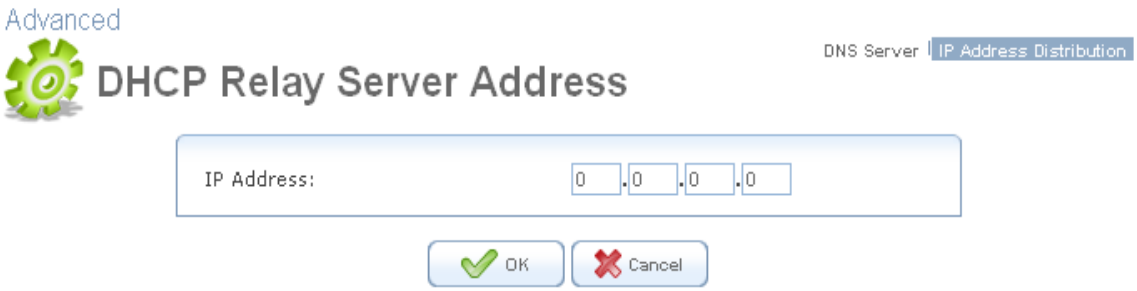


Figure 9-39: DHCP Relay Server Address

Specify the IP address of the DHCP server.

Click 'OK' to save the settings.

- **Disabled** - Select 'Disabled' from the combo-box if you would like to statically assign IP addresses to your network computers.

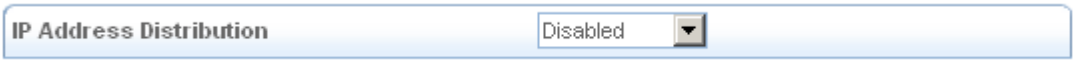


Figure 9-40: IP Address Distribution - Disable DHCP

9.4.4.3 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
- **NAPT** Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses multiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.

- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Multicast – IGMP Proxy Internal IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Internal' check box to enable this feature.

- **IGMP Query Version** Watson supports all three versions of IGMP. Select the version you would like to use.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

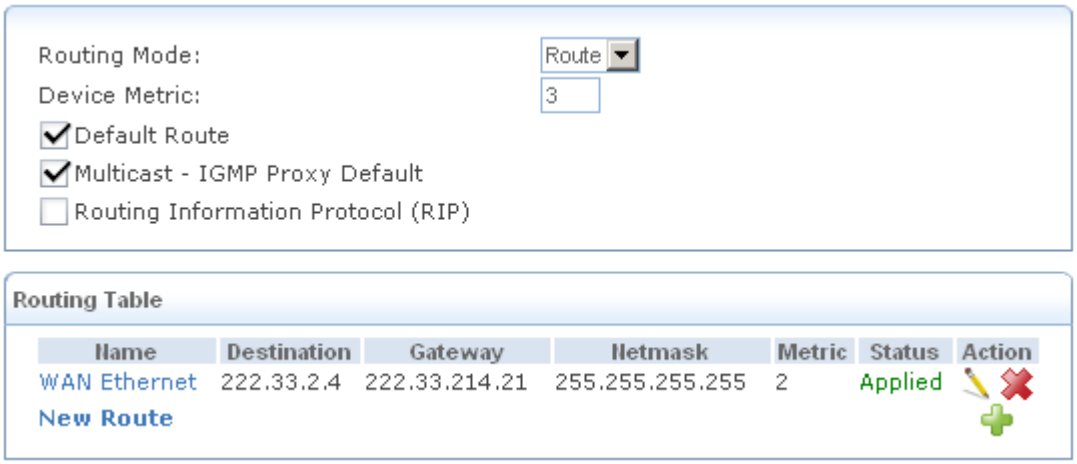


Figure 9-41: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.4.4 VLAN

This section displays the VLAN settings of the integrated hardware Ethernet switch. The Switch has two modes of operation:

- In **transparent mode** the Switch is transparent to all VLANs, no further configuration is needed.

- In **802.1q mode** the untagged packets (packets with no VLAN tag) that arrive in a port, will be tagged with the default VLAN identifier that is configured for each port.

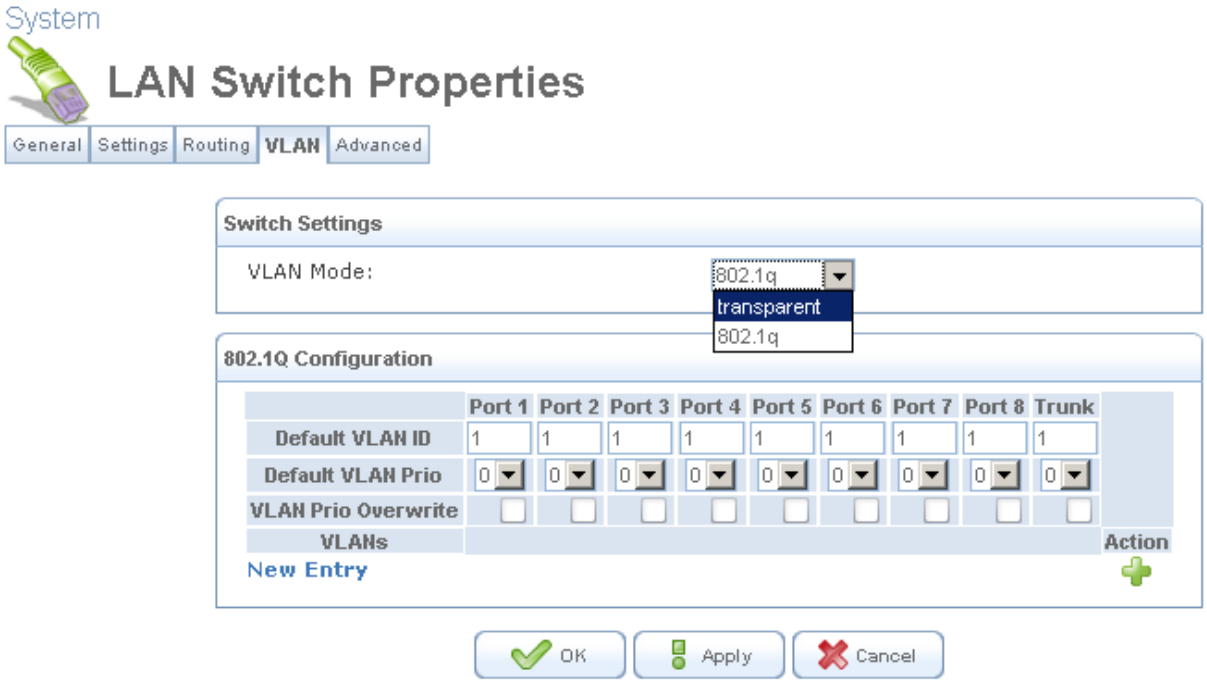


Figure 9-42: Switch VLAN

VLAN Mode Select one of the following Switch modes:

- **Transparent** In transparent mode the switch is transparent to all VLANs.
- **802.1q** In 802.1Q mode each of the Ethernet Switch ports can be member of one or several VLANs. The switch can have up to 15 IVLs (Independent VLAN Learning databases) or up to 64 SVLs (Shared VLAN Learning Databases). Each VLAN has a VLAN Identifier (VID) between 1 and 4094. Upon reception of an Ethernet packet at a port its VID is checked against the VIDs of all VLANs this port is a member of. Packets that do not carry one of these VIDs will be discarded. For untagged packets the default VID for the port is used to determine VLAN membership. Packets are only forwarded to ports that are a member of the VLAN of this packet. Upon transmission the packet will be tagged with the VLAN tag originally received. If the packet was untagged then the default tag of the receiving port is added to the packet. The ports can also be configured to send the packets untagged.

802.1Q Configuration – The 802.1Q configuration is only visible in 802.1q mode.

Default VLAN ID – The default VLAN identifier of each ports. Port1 to Port8 are physical Ethernet ports, which are available at the rear of Watson device. The Trunk port is the switch uplink port which is internally connected to the router LAN-side.

Default VLAN Prio – The default VLAN priority of each ports.

VLAN Prio Overwrite – When selected the default VLAN priority will overwrite the VLAN priority of the packets eggressing the switch port.

VLANs – Allows you to add and delete VLANs from the VLAN table in the manner described in Section 4.3. Click the 'New Entry' link to add a VLAN to the table. The 'Add Switch VLAN Screen' appears:

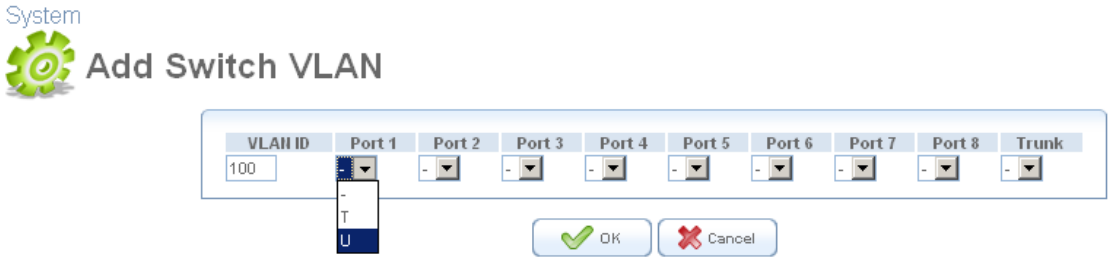


Figure 9-43: Add Switch VLAN

VLAN ID – The VLAN identifier of VLAN.

Port – Each port can either be 'T' tagged, 'U' untagged or '–' not member of this VLAN.

- 'T' means that outgoing packets will be tagged with the VLAN identifier.
- 'U' means that outgoing packets will not be tagged.
- '–' means that the port is not member of the VLAN.

Note: Before marking the Trunk port with a 'T' (tagged), make sure that you have already created a VLAN interface on the LAN side of the router. The procedure to create a VLAN interface on the router is described in section 9.4.11.

If you fail to do so, you might loose connectivity to the Watson management. If you loose connection to the Web-based management you can restore the factory default configuration. The procedure is described in the Watson SHDSL Router Manual [1].

9.4.4.5 VLAN Example

A VLAN configuration example is shown in Figure 9-44:

1. Two VLANs are configured: VLAN 100 and VLAN 200.

   - Ports 1, 2, 3 and 4 are members of VLAN 100.
   - Ports 5, 6, 7 and 8 are members of VLAN 200.
   - The Trunk port is member of both VLANs: VLAN 100 and VLAN 200.

2. For untagged packets the default VLAN ID for the port is used to determine VLAN membership.

   - Ports 1, 2, 3 and 4 and the Trunk port have a default VLAN ID 100.
   - Ports 5, 6, 7 and 8 have the default VLAN ID 200.

3. Upon transmission, ports that are marked with ‘T’ (tagged) will send the packets tagged and ports that are marked with ‘U’ (untagged) will send the packets untagged.

   - Ports 1, 2, 5 and 6 will send the packets untagged.
   - Ports 3, 4, 7 and 8 will send the packets tagged.
   - The Trunk port will send packet which belongs to VLAN 100 untagged, packets which belongs to VLAN 200 tagged.

4. In order to access the web-based management from ports 5, 6, 7 or 8 (which belongs to VLAN 200), you will first have to create a VLAN 200 interface on the router LAN-side. The procedure to create a VLAN interface on the router is described in section 9.4.11.

Figure 9-44: VLAN Example

9.4.4.6 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-45: Internet Connection Firewall

Additional IP Addresses You can add alias names (additional IP addresses) to the gateway by clicking the 'New IP Address' link. This enables you to access the gateway using these aliases in addition to the 192.168.1.1.

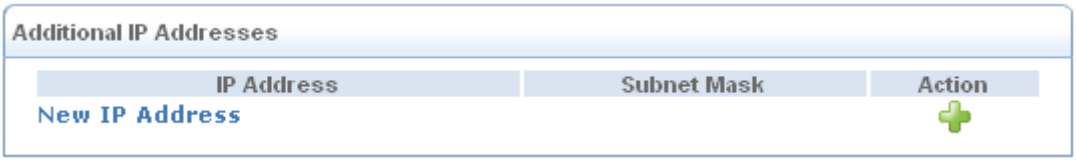


Figure 9-46: Additional IP Addresses

9.4.5 LAN Ethernet

A LAN Ethernet connection connects computers to Watson using Ethernet cables.

9.4.5.1 General

To view and edit the LAN Ethernet connection settings, click the 'LAN Ethernet' link in the 'Network Connections' screen (see Figure 9-11). You may need to press the 'Advanced' button to expand the screen and display all connection entries. The 'LAN Ethernet Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the settings tab, as described in the following sections.

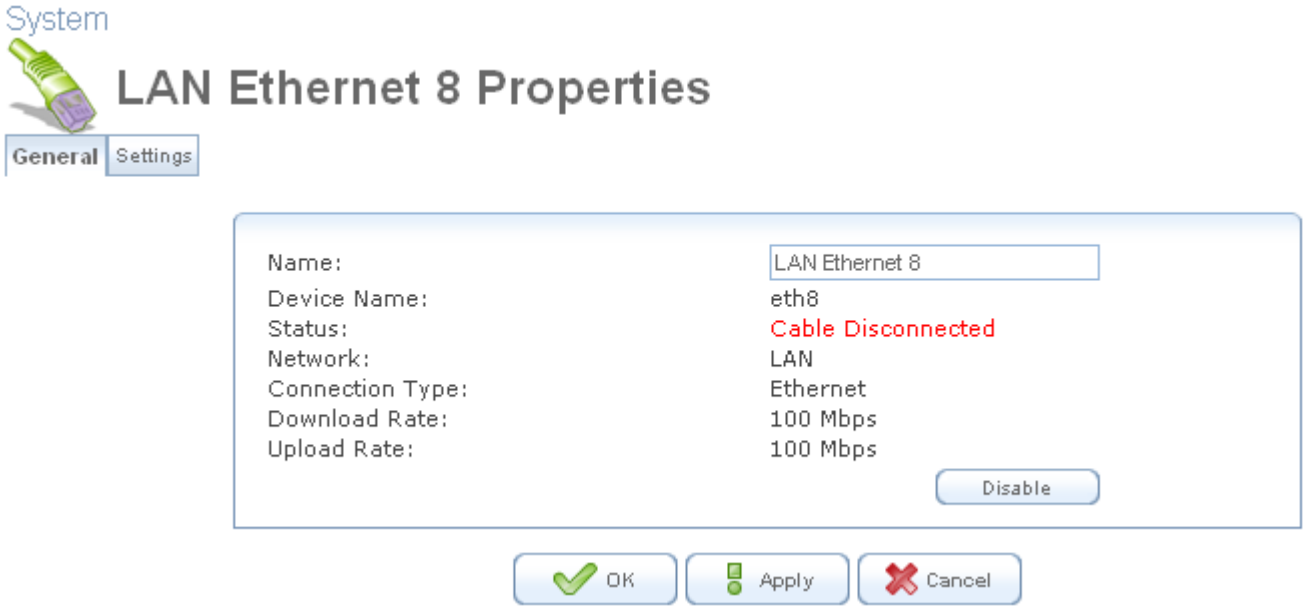


Figure 9-47: LAN Ethernet Properties

Disable Press the Disable button to disable the interface.

9.4.5.2 Settings

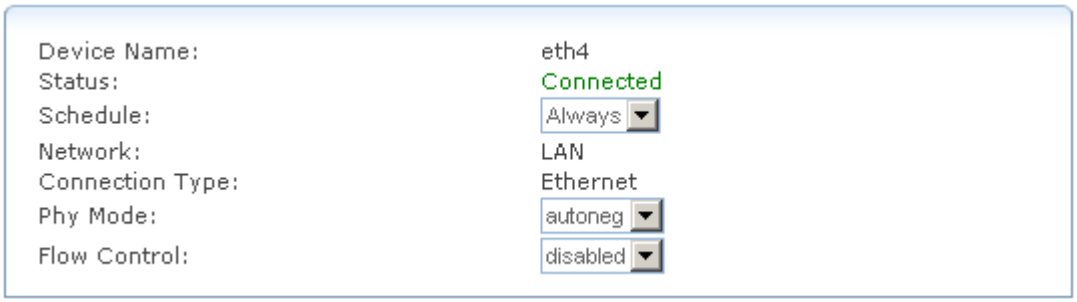


Figure 8.48. LAN Ethernet Settings

Phy Mode Manualy select the Ethernet connection speed or select autoneg for automatic negotiation of connection speed. The different possible selection are: autonegotiation mode, 10BT half duplex, 10BT full duplex, 100BTX half duplex, 100BTX full duplex.

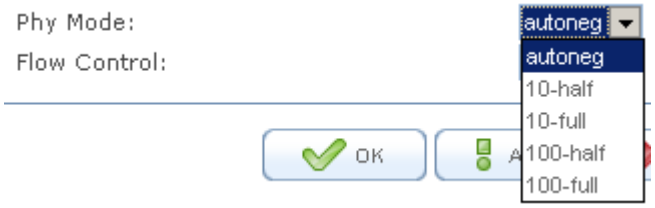


Figure 8.48. LAN Ethernet PHY mode

Flow Control Enables the Ethernet Flow control mechanism. Flow control is disabled by default.

9.4.6 DSL

The DSL connection screens lets you configure and monitor the Watson SHDSL modem.

9.4.6.1 DSL Configuration

To edit the DSL configuration, click the ‘DSL’ link in the ’Network Connections’ screen (see Figure 9-11). The ‘Internet Connection Settings’ screen will appear.

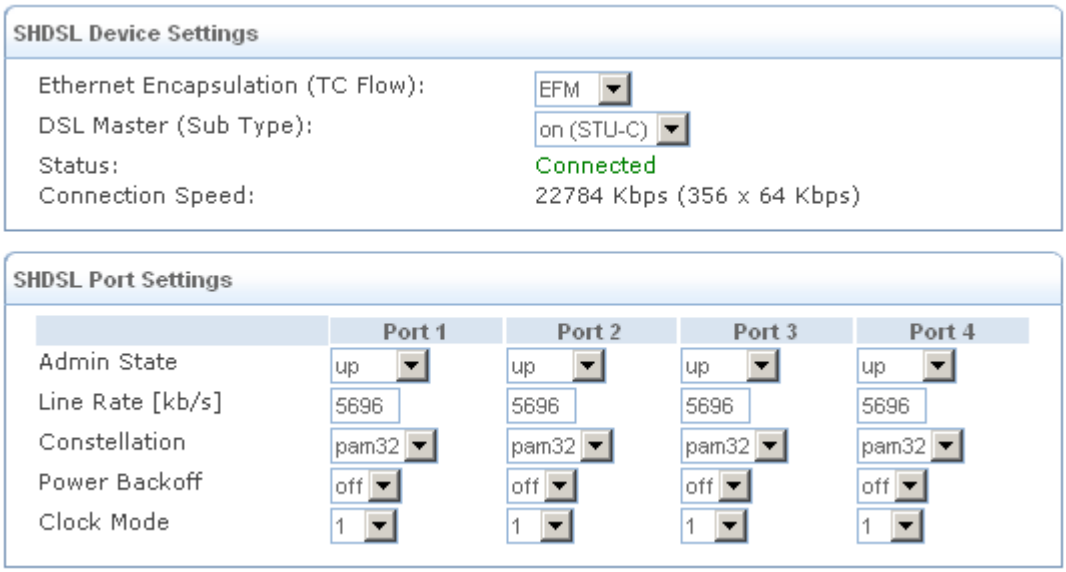


Figure 9-48: DSL Configuration

Ethernet Encapsulation (TC Flow) Select ’EFM’ or ’HDLC’ encapsulation. Use ‘HDLC’ encapsulation when the Watson SHDSL router is connected to a Watson Ethernet plug-in (SZ.866.V654) [2].

DSL Master (Sub Type) Select ‘off (STU-R)’ or ‘on (STU-C)’. If two Watson SHDSL router are connected point-to-point together, one device has to be set to ‘off’ and the other device has to be set to ‘on’. Use ‘off (STU-R)’ when the Watson SHDSL router is connected to a Watson Ethernet plug-in (SZ.866.V654) [2].

Admin State Select ‘up’ or ‘down’. Allows to block certain ports and alarms.

Line Rate [kb/s] Enter the line rate of the ports. This configuration field is only visible when DSL Master is ‘on’. The master modem sets the line rate.

Constellation Select ‘pam16’ , ‘pam32’ , ‘pam64’ or ‘pam128’. This configuration field is only visible when DSL Master is ‘on’.

Power Backoff Select ‘on’ or ‘off’. Default is ‘off’. For short distances you can turn it on to reduce the transmitted power.

9.4.6.2 DSL Status

To view the DSL status, select the SHDSL Status tab in the ‘Internet Connection’ page. The 'SHDSL Status' screen provides the SHDSL port status and performance.

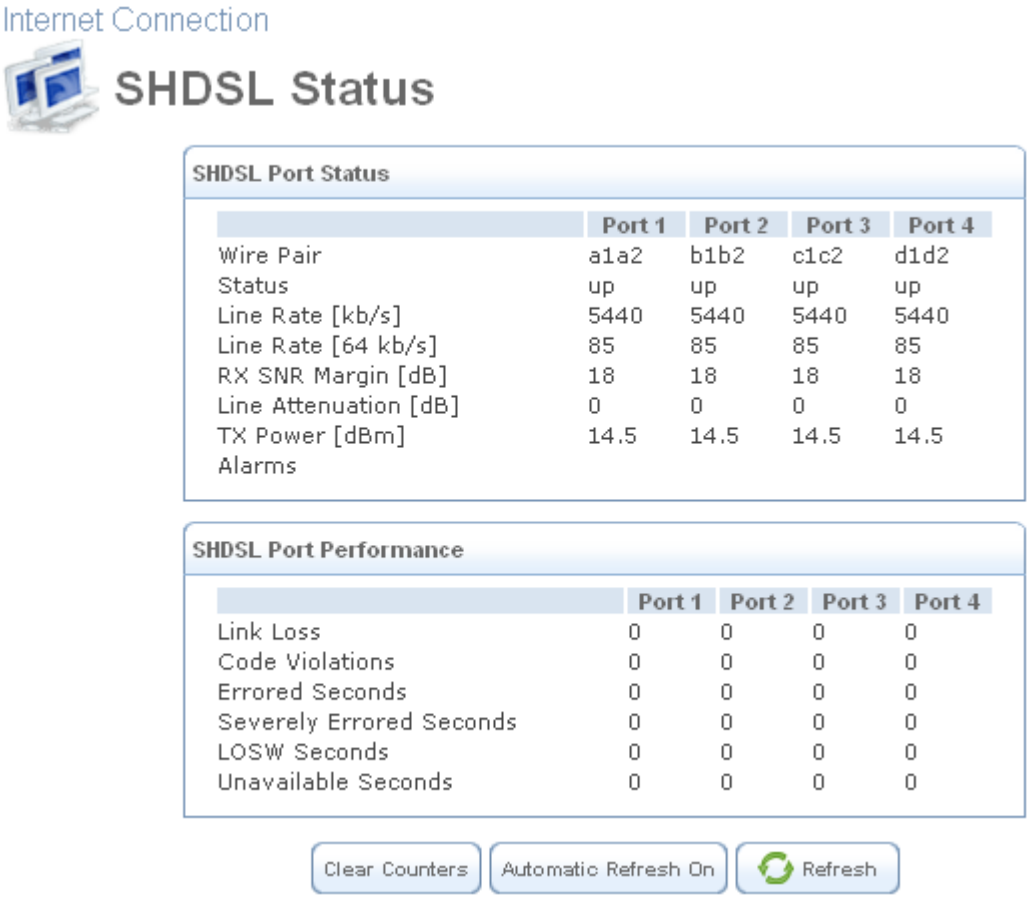

Internet Connection
SHDSL Status
SHDSL Port Status
Port 1 Port 2 Port 3 Port 4
Wire Pair a1a2 b1b2 c1c2 d1d2
Status up up up up
Line Rate [kb/s] 5440 5440 5440 5440
Line Rate [64 kb/s] 85 85 85 85
RX SNR Margin [dB] 18 18 18 18
Line Attenuation [dB] 0 0 0 0
TX Power [dBm] 14.5 14.5 14.5 14.5
Alarms
SHDSL Port Performance
Port 1 Port 2 Port 3 Port 4
Link Loss 0 0 0 0
Code Violations 0 0 0 0
Errored Seconds 0 0 0 0
Severely Errored Seconds 0 0 0 0
LOSW Seconds 0 0 0 0
Unavailable Seconds 0 0 0 0
Clear Counters
Automatic Refresh On
Refresh

Figure 9-49: DSL Status

Click 'Clear Counters' to reset the performance counters.

9.4.7 Dynamic Host Configuration Protocol (DHCP)

The Dynamic Host Configuration Protocol (DHCP) connection is a dynamic negotiation method, where the client obtains an IP address automatically from the service provider when connecting to the Internet. To configure a new DHCP connection, perform the following steps:

1. Click the 'New Connection' link in the 'Network Connections' screen (see Figure 9-11). The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Internet Connection' radio button and click 'Next'. The 'Internet Connection' screen appears (see Figure 9-13).
3. Select the ‘Ethernet Connection’ radio button and click Next. The 'Ethernet Connection' screen appears:

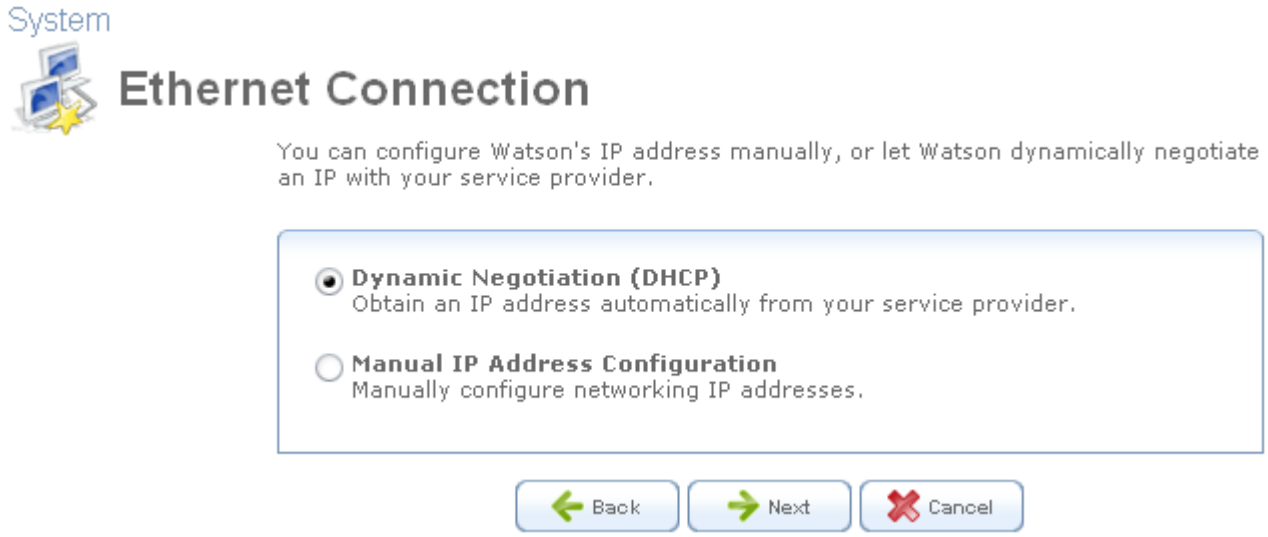

System
Ethernet Connection
You can configure Watson's IP address manually, or let Watson dynamically negotiate an IP with your service provider.
Dynamic Negotiation (DHCP)
Obtain an IP address automatically from your service provider.
Manual IP Address Configuration
Manually configure networking IP addresses.
Back
Next
Cancel

Figure 9-50: Ethernet Connection

4. Select the 'Dynamic Negotiation (DHCP)' radio button and click Next. The 'Connection Summary' screen will appear.

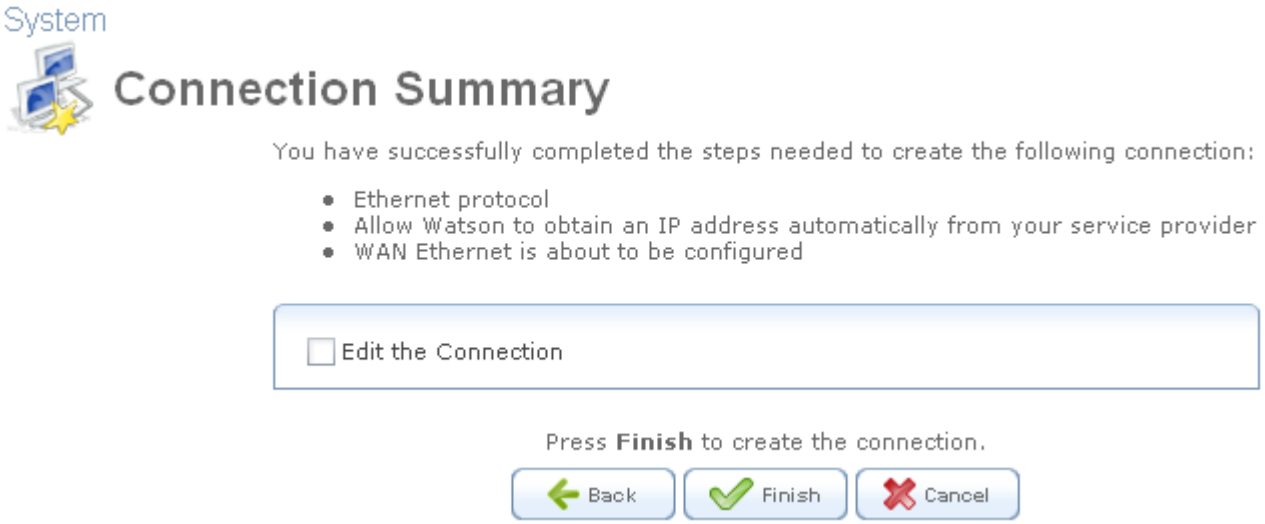

System
Connection Summary
You have successfully completed the steps needed to create the following connection:
Ethernet protocol
Allow Watson to obtain an IP address automatically from your service provider
WAN Ethernet is about to be configured
Edit the Connection
Press Finish to create the connection.
Back
Finish
Cancel

Figure 9-51: Connection Summary

5. Select the 'Edit the Connection' check box if you wish to be routed to the WAN Ethernet Properties screen after clicking 'Finish'.
6. Click Finish to save the settings.

The WAN Ethernet connection will be configured to obtain an IP address from a DHCP server. Refer to Section 9.4.3 to learn how to view and edit the WAN Ethernet connection's settings.

Note: If your WAN connection is set to DHCP when there is no DHCP server available, and a PPPoE server is available instead, the device status will show: "Waiting for DHCP Lease - PPPoE server found, consider configuring your WAN connection to PPPoE". If you select this option, refer to Section 9.4.9.

9.4.8 Manual IP Address Configuration

The Manual IP Address Configuration connection is used to manually configure the networking IP addresses when connecting to the Internet. To manually configure the IP addresses, perform the following steps:

1. Click the 'New Connection' link in the 'Network Connections' screen (see Figure 9-11). The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Internet Connection' radio button and click 'Next'. The 'Internet Connection' screen appears (see Figure 9-13).
3. Select the ‘Ethernet Connection’ radio button and click Next. The 'Ethernet Connection' screen appears:

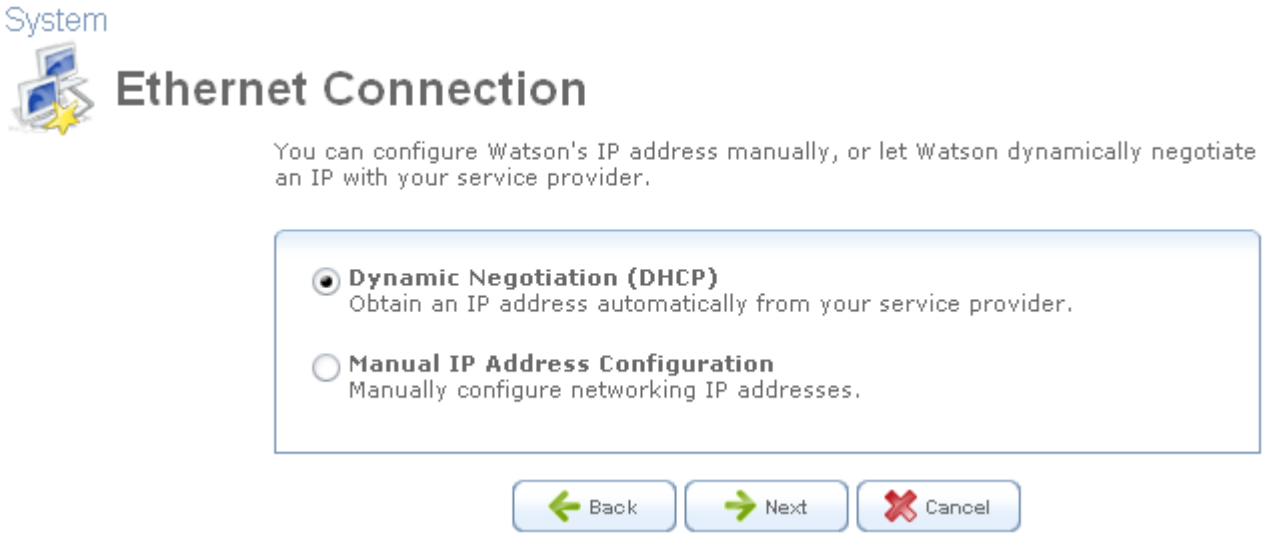

System
Ethernet Connection
You can configure Watson's IP address manually, or let Watson dynamically negotiate an IP with your service provider.
Dynamic Negotiation (DHCP)
Obtain an IP address automatically from your service provider.
Manual IP Address Configuration
Manually configure networking IP addresses.
Back
Next
Cancel

Figure 9-52: Ethernet Connection

4. Select the 'Manual IP Address Configuration' radio button and click Next. The 'Manual IP Address Configuration' screen appears:

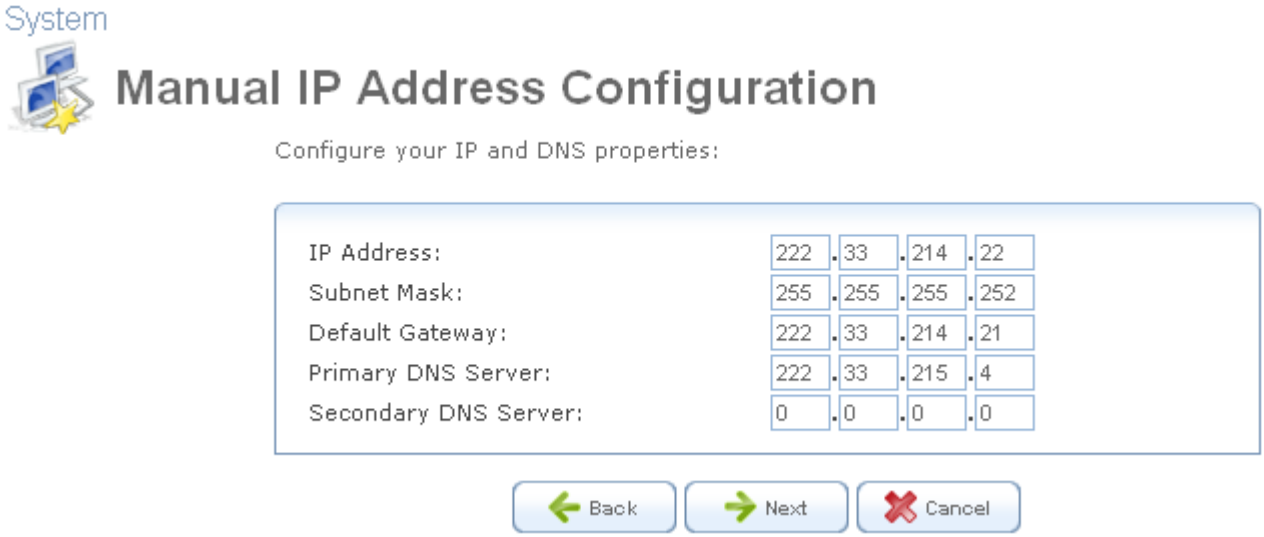

System
Manual IP Address Configuration
Configure your IP and DNS properties:
IP Address: 222 . 33 . 214 . 22
Subnet Mask: 255 . 255 . 255 . 252
Default Gateway: 222 . 33 . 214 . 21
Primary DNS Server: 222 . 33 . 215 . 4
Secondary DNS Server: 0 . 0 . 0 . 0
Back
Next
Cancel

Figure 9-53: Manual IP Address Configuration

5. Enter the IP address, subnet mask, default gateway, and DNS server addresses in their respective fields. These values should either be provided to you by your ISP or configured by your system administrator.

6. Click Next. The 'Connection Summary' screen appears:

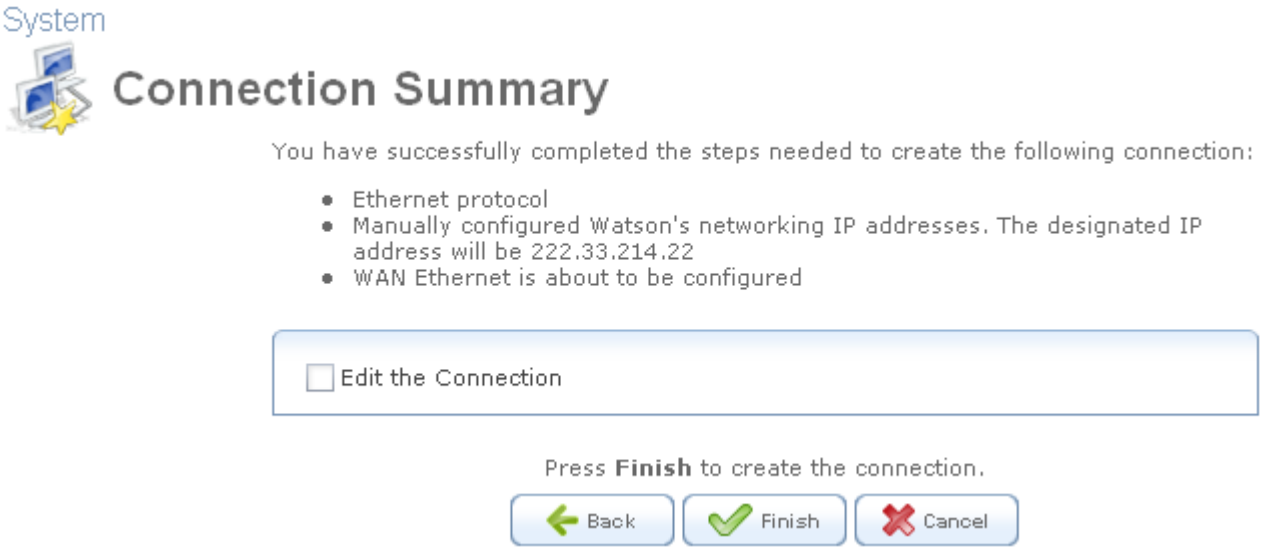

System
Connection Summary
You have successfully completed the steps needed to create the following connection:
Ethernet protocol
Manually configured Watson's networking IP addresses. The designated IP address will be 222.33.214.22
WAN Ethernet is about to be configured
Edit the Connection
Press Finish to create the connection.
Back
Finish
Cancel

Figure 9-54: Connection Summary

7. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the WAN Ethernet Properties screen after clicking 'Finish'. This screen is described later in this chapter.

8. Click Finish to save the settings.

The WAN Ethernet connection will be configured with the new settings. Refer to Section 9.4.3 to learn how to view and edit the WAN Ethernet connection's settings.

9.4.9 Point-to-Point Protocol over Ethernet (PPPoE)

Point-to-Point Protocol over Ethernet (PPPoE) relies on two widely accepted standards, PPP and Ethernet. PPPoE enables your home network PCs that communicate on an Ethernet network to exchange information with PCs on the Internet. PPPoE supports the protocol layers and authentication widely used in PPP and enables a point-to-point connection to be established in the normally multipoint architecture of Ethernet. A discovery process in PPPoE determines the Ethernet MAC address of the remote device in order to establish a session.

9.4.9.1 Creation with the Connection Wizard

To create a new PPPoE connection, perform the following steps:

1. Click the 'New Connection' link in the 'Network Connections' screen (see Figure 9-11). The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the ‘Point-to-Point Protocol over Ethernet (PPPoE)’ radio button and click Next. The 'Point-to-Point Protocol over Ethernet' screen will appear.
4. Select WAN Ethernet as underlying device and click Next.

Figure 9-55: Point-to-Point Protocol over Ethernet

5. Enter the username and password provided by your Internet Service Provider (ISP), and click Next. The 'Connection Summary' screen will appear.

Figure 9-56: Connection Summary

6. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the new connection's configuration screen after clicking 'Finish'. This screen is described later in this chapter.
7. Click Finish to save the settings.

The new PPPoE connection will be added to the network connections list, and will be configurable like any other connection.

Note: If your WAN connection is set to PPPoE when there is no PPPoE server available, and a DHCP server is available instead, the device status will show: "In Progress - DHCP server found, consider configuring your WAN connection to Automatic". If you select this option, refer to Section 5.4.1.2.

9.4.9.2 General

To view and edit the PPPoE connection settings, click the 'WAN PPPoE' link in the 'Network Connections' screen (see Figure 9-11). The 'WAN PPPoE Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

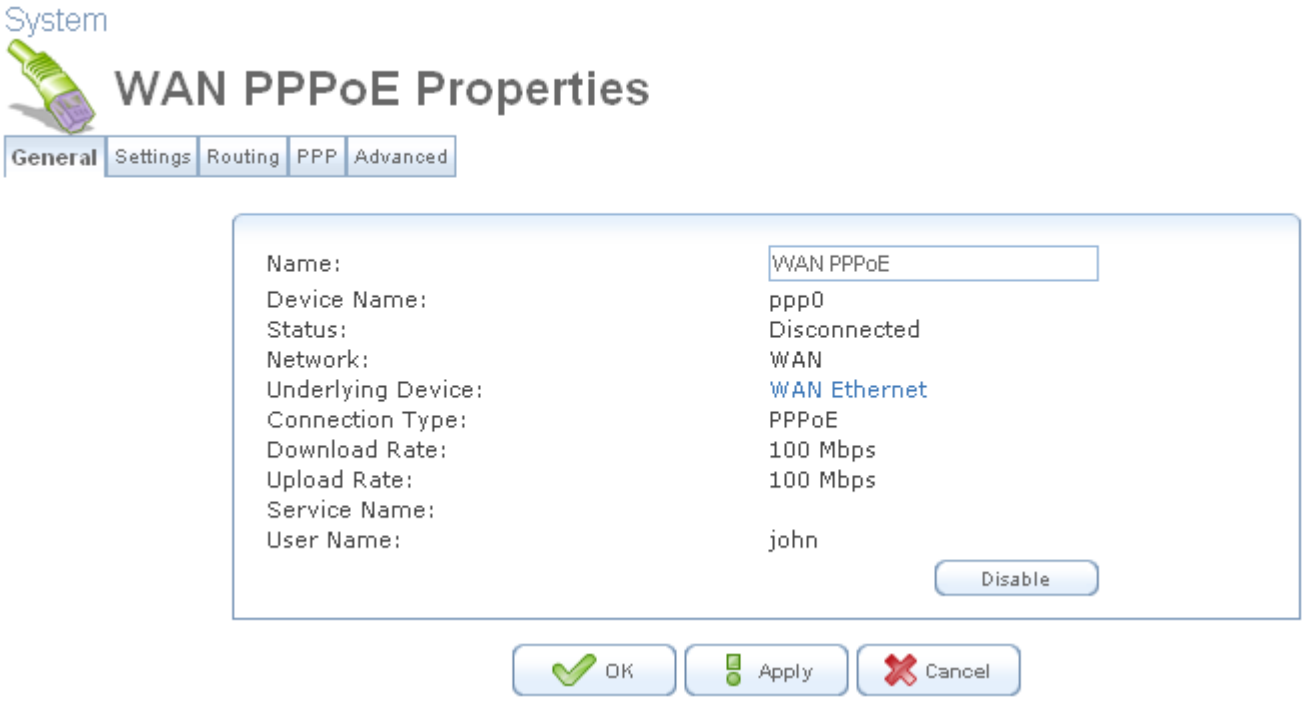


Figure 9-57: WAN PPPoE Properties

9.4.9.3 Settings

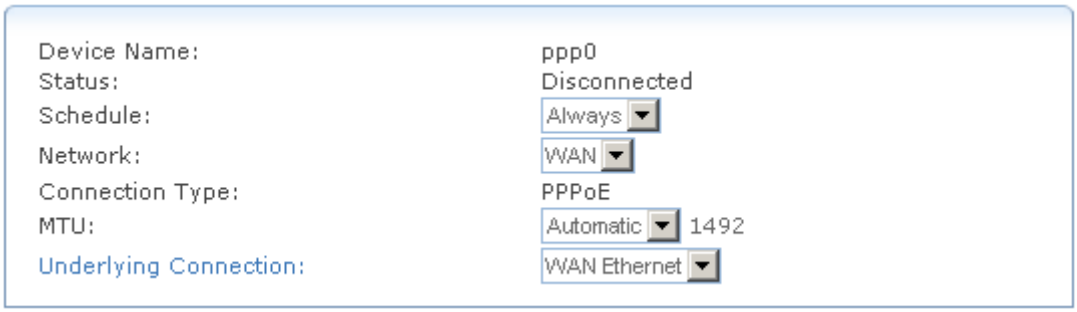


Figure 9-58: PPPoE Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to 9.4.2.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic' to let Watson find the optimal MTU value for your connection. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Underlying Connection Specify the underlying connection above which the protocol will be initiated.

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' combo-box:

- Unnumbered
- Obtain an IP Address Automatically
- Use the Following IP Address

Please note that the screen will refresh to display relevant configuration settings according to your choice.

Unnumbered Select this option to assign a predefined LAN address as Watson's WAN address. This is useful when Watson operates in routing mode. Before selecting this option, configure the 'Internet Protocol' of your LAN device (or bridge, in case the LAN device is under a bridge) to use a permanent (static) IP address from the range of IP addresses provided by your ISP (instead of 192.168.1.1).

Figure 9-59: Internet Protocol – Unnumbered

Obtain an IP Address Automatically Your connection is configured by default to obtain an IP automatically. You should change this configuration in case your service provider requires it. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead.

Figure 9-60: Internet Protocol – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

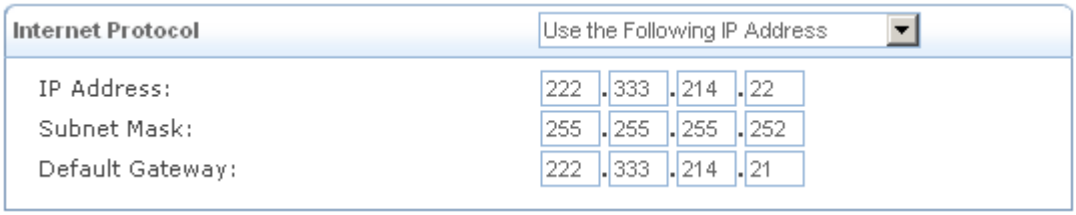

Internet Protocol
Use the Following IP Address
IP Address:
222 . 333 . 214 . 22
Subnet Mask:
255 . 255 . 255 . 252
Default Gateway:
222 . 333 . 214 . 21

Figure 9-61: Internet Protocol – Static IP

DNS Server Domain Name System (DNS) is the method by which Web site domain names are translated into IP addresses. You can configure the connection to automatically obtain a DNS server address, or specify such an address manually, according to the information provided by your ISP. To configure the connection to automatically obtain a DNS server address, select 'Obtain DNS Server Address Automatically' from the 'DNS Server' drop down menu.

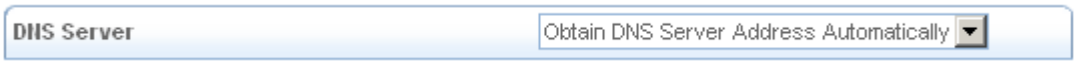


Figure 9-62: DNS Server – Automatic IP

To manually configure DNS server addresses, select 'Use the Following DNS Server Addresses' from the 'DNS Server' drop down menu (see Figure 9-63). Specify up to two different DNS server address, one primary, another secondary.

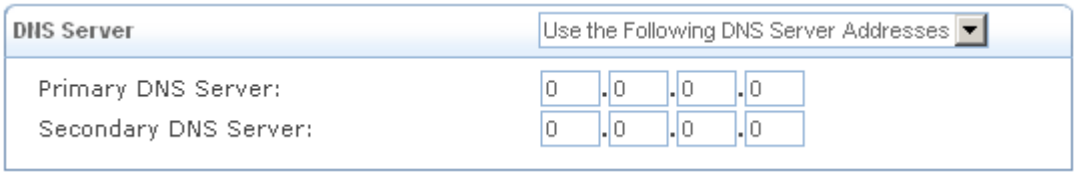


Figure 9-63: DNS Server – Static IP

To learn more about this feature, refer to Section 8.6.1.

9.4.9.4 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

Route Use route mode if you want your gateway to function as a router between two networks.

NAPT Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses multi-

ple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

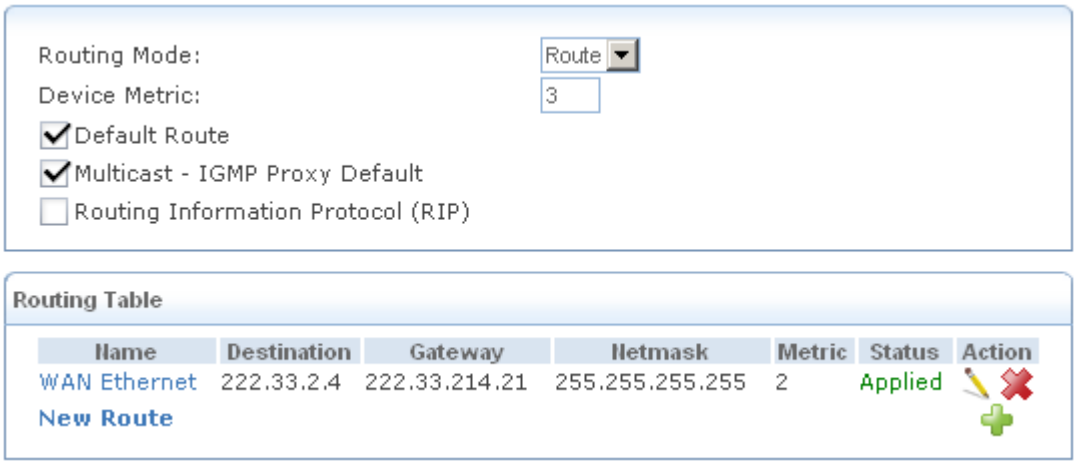


Figure 9-64: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.9.5 PPP

Point-to-Point Protocol (PPP) is the most popular method for transporting packets between the user and the Internet service provider. PPP supports authentication protocols such as PAP and CHAP, as well as other compression and encryption protocols.

Service Name Specify the networking peer's service name, if provided by your ISP.

PPP-on-Demand Use PPP on demand to initiate the point-to-point protocol session only when packets are actually sent over the Internet.

Time Between Reconnect Attempts Specify the duration between PPP reconnected attempts, as provided by your ISP.

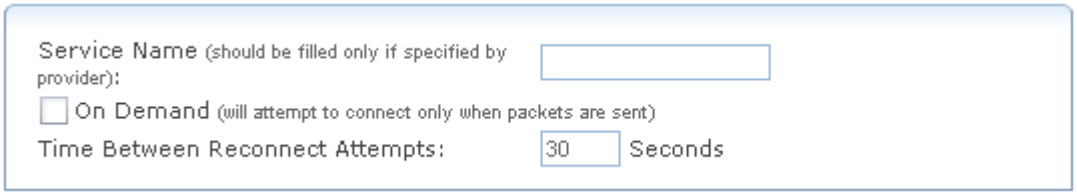

Service Name (should be filled only if specified by provider):
On Demand (will attempt to connect only when packets are sent)
Time Between Reconnect Attempts:
30
Seconds

Figure 9-65: PPP Configuration

PPP Authentication Point-to-Point Protocol (PPP) currently supports four authentication protocols: Password Authentication Protocol (PAP), Challenge Handshake Authentication Protocol (CHAP), and Microsoft CHAP version 1 and 2. This section allows you to select the authentication protocols your gateway may use when negotiating with a PPTP server. Select all the protocols if no information is available about the server's authentication protocols. Note that encryption is performed only if 'Microsoft CHAP', 'Microsoft CHAP version 2', or both are selected.

Figure 9-66: PPP Authentication

Login User Name As agreed with ISP.

Login Password As agreed with ISP.

Support Unencrypted Password (PAP) Password Authentication Protocol (PAP) is a simple, plain-text authentication scheme. The user name and password are requested by your networking peer in plain-text. PAP, however, is not a secure authentication protocol. Man-in-the-middle attacks can easily determine the remote access client's password. PAP offers no protection against replay attacks, remote client impersonation, or remote server impersonation.

Support Challenge Handshake Authentication (CHAP) The Challenge Handshake Authentication Protocol (CHAP) is a challenge-response authentication protocol that uses MD5 to hash the response to a challenge. CHAP protects against replay attacks by using an arbitrary challenge string per authentication attempt.

Support Microsoft CHAP Select this check box if you are communicating with a peer that uses Microsoft CHAP authentication protocol.

Support Microsoft CHAP Version 2 Select this check box if you are communicating with a peer that uses Microsoft CHAP Version 2 authentication protocol.

PPP Encryption PPP supports encryption facilities to secure the data across the network connection. A wide variety of encryption methods may be negotiated, although typically only one method is used in each direction of the link. This section allows you to select the encryption methods your gateway may use when negotiating with a PPTP server. Select all the methods if no information is available about the server's encryption methods. Please note that PPP encryption can only be used with MS-CHAP or MS-CHAP-V2 authentication protocols.

PPP Encryption
Require Encryption (disconnect if server declines)
Support Encryption (40 bit keys)
Support Maximum Strength Encryption (128 bit keys)

Figure 9-67: PPP Encryption

Require Encryption Select this check box to ensure that the PPP connection is encrypted.

Support Encryption (40 Bit Keys) Select this check box if your peer supports 40 bit encryption keys.

Support Maximum Strength Encryption (128 Bit Keys) Select this check box if your peer supports 128 bit encryption keys.

PPP Compression The PPP Compression Control Protocol (CCP) is responsible for configuring, enabling, and disabling data compression algorithms on both ends of the point-to-point link. It is also used to signal a failure of the compression/ decompression mechanism in a reliable manner.

Figure 9-68: PPP Compression

For each compression algorithm, select one of the following from the drop down menu:

- **Reject** Reject PPP connections with peers that use the compression algorithm.
- **Allow** Allow PPP connections with peers that use the compression algorithm.
- **Require** Ensure a connection with a peer is using the compression algorithm.

9.4.9.6 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-69: Internet Connection Firewall

9.4.10 Network Bridging

With the Network Bridging connection you can create a bridge over WAN and LAN devices. This way computers on the Watson LAN side can get IP addresses that are known on the WAN side.

9.4.10.1 Creation with the Connection Wizard

To configure an existing bridge or create a new one, perform the following:

1. Click the 'New Connection' link in the 'Network Connections' screen (see Figure 9-11). The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the 'Network Bridging' radio button and click 'Next'. The 'Network Bridging' screen appears allowing you to add new connections or remove existing ones, by selecting or deselecting their respective check boxes. For example, check the WAN and LAN check box to create a LAN-WAN bridge.

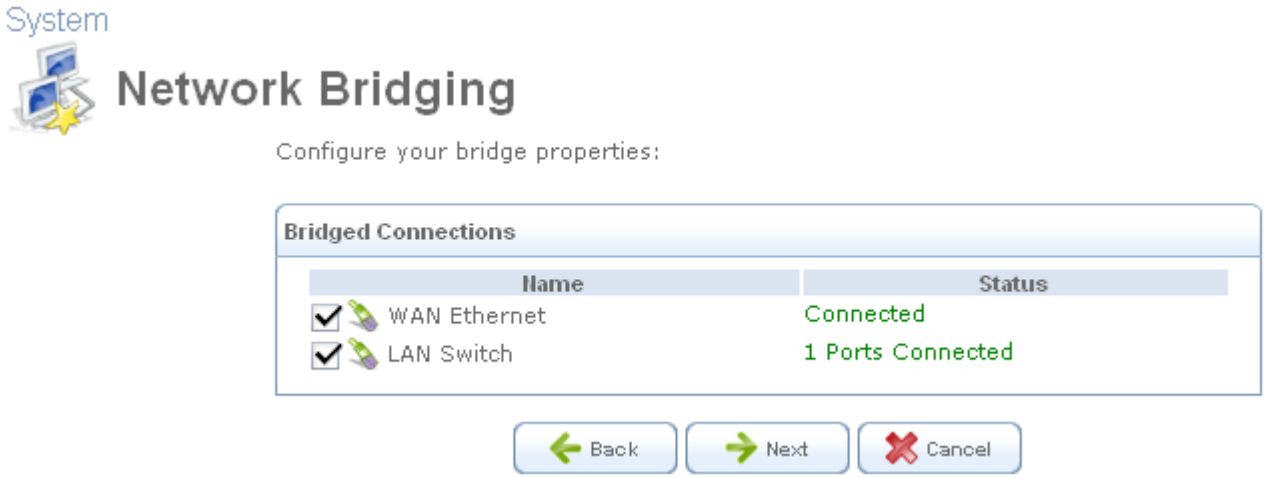


Figure 9-70: Network Bridging

4. Click 'Next'. The 'Connection Summary' screen appears, corresponding to your changes.

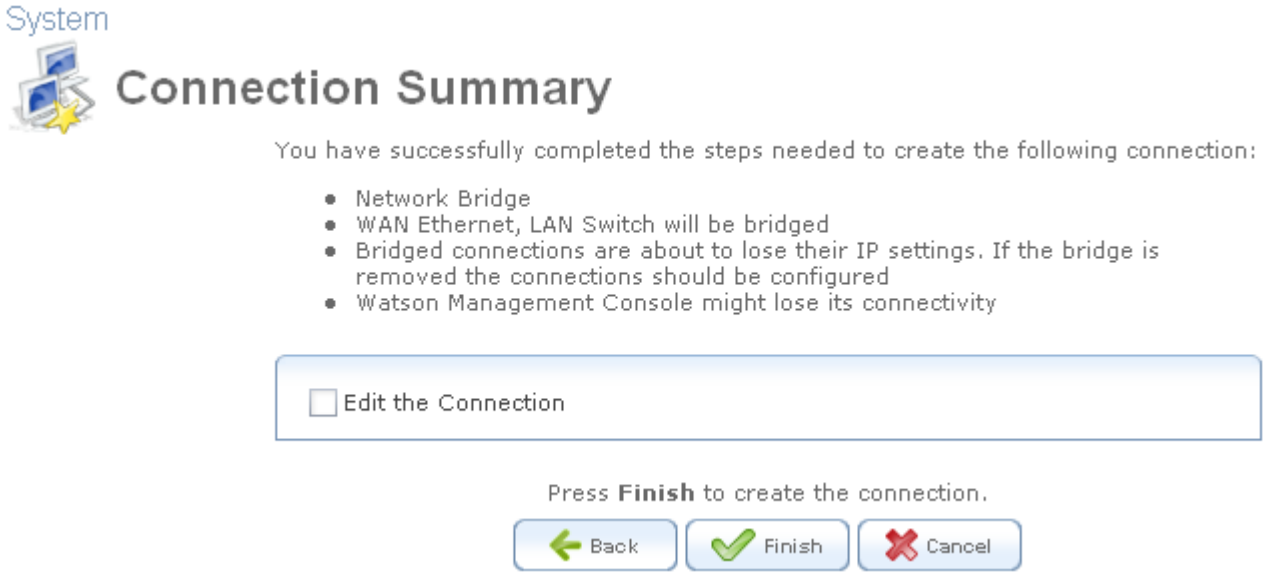

System
Connection Summary
You have successfully completed the steps needed to create the following connection:
Network Bridge
WAN Ethernet, LAN Switch will be bridged
Bridged connections are about to lose their IP settings. If the bridge is removed the connections should be configured
Watson Management Console might lose its connectivity
Edit the Connection
Press Finish to create the connection.
Back
Finish
Cancel

Figure 9-71: Connection Summary – Network Bridging

5. Select the 'Edit the Connection' check box if you wish to be routed to the ‘Bridge Properties’ screen after clicking 'Finish'. This screen is described later in this chapter.

6. Click 'Finish' to save the settings.

The new bridge will be added to the network connections list, and it will be configurable like any other bridge.

9.4.10.2 Setting up a Hybrid Bridging Mode

Watson enables you to bridge certain bandwidth-consuming and traffic-sensitive LAN hosts, such as IPTV Set Top Boxes, directly to the WAN. Such a network connection scheme does not interfere with Watson's routing mode, in which all traffic usually passes through the NAT, and is checked by the firewall. These two modes can work simultaneously together.

Watson detects LAN hosts that should be bridged to the WAN according to their MAC address or a specific DHCP option (either Vendor Class ID, Client ID or User Class ID). Once detected, these LAN hosts are placed under the WAN-LAN bridge, which you must add and configure for the hybrid bridging mode beforehand. To add the WAN-LAN bridge, follow the Connection Wizard steps described in Section 9.4.10.1. In the final step, check the 'Edit the Newly Created Connection' check box, and click 'Finish'. The 'Bridge Properties' screen appears.

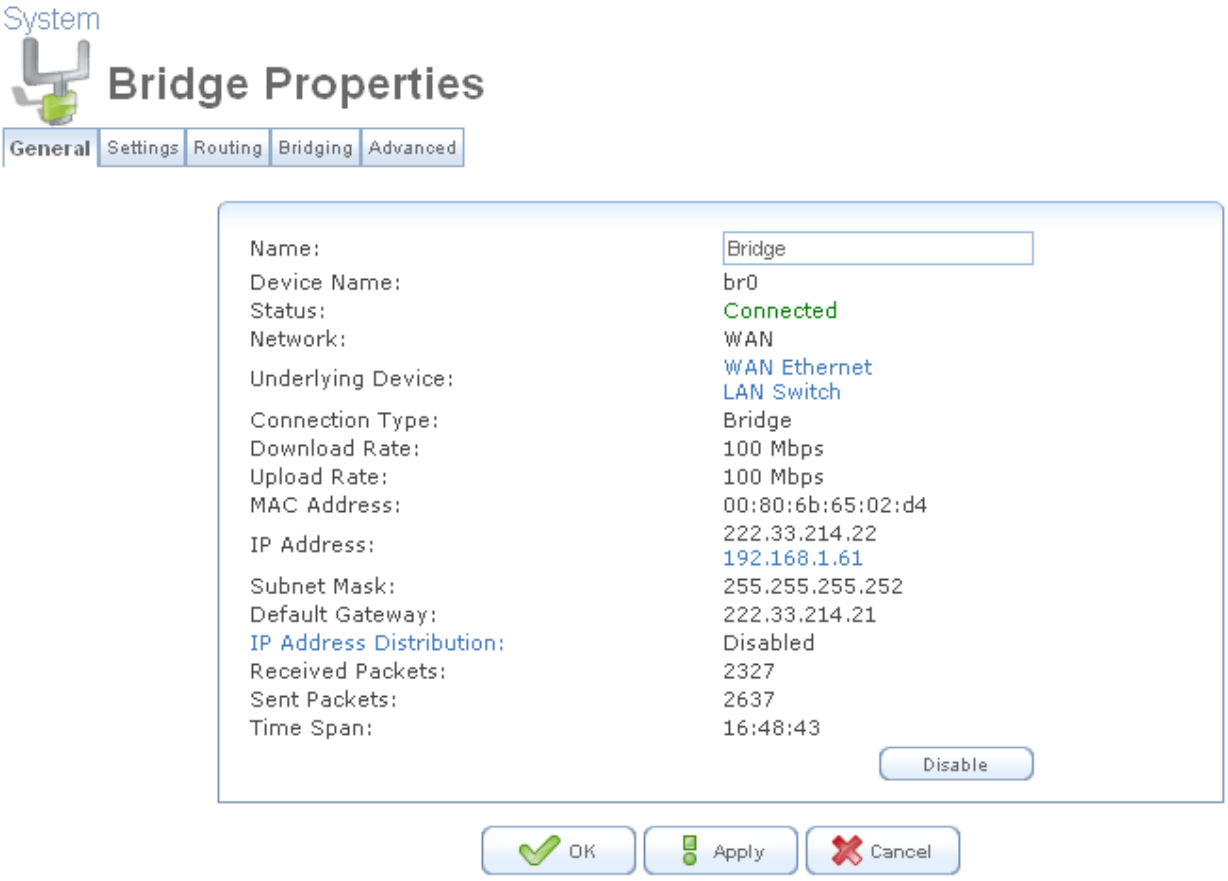


Figure 9-72: Bridge Properties

To configure the WAN-LAN bridge for the hybrid bridging mode, perform the following:

1. In the 'Bridge Properties' screen, click the 'Routing' tab. The following screen appears.

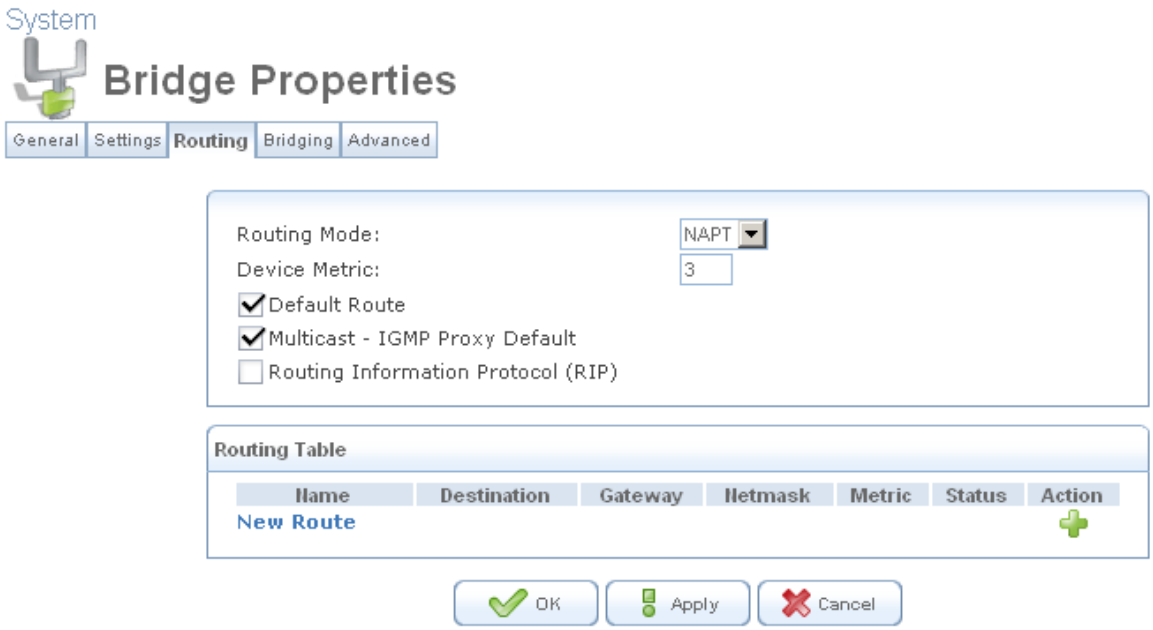


Figure 9-73: Bridge Routing Settings

2. From the 'Routing Mode' drop-down menu, select 'Route' and click 'Apply'. The following warning screen appears.

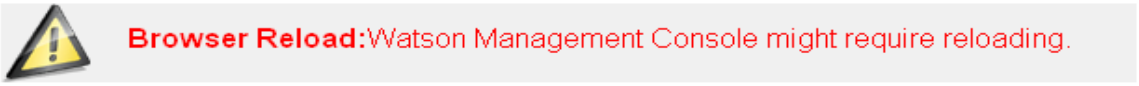


Figure 9-74: Browser Reload Warning Message

3. Click 'OK'. The page refreshes while saving the new settings, and returns to the previous screen.

4. Click the 'Bridging' tab. The following screen appears.

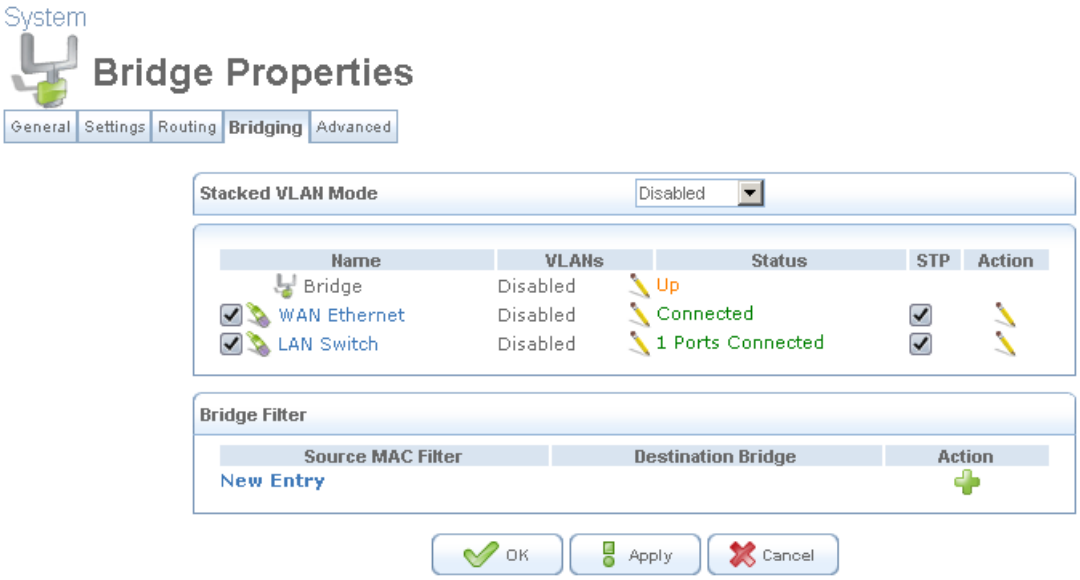


Figure 9-75: WAN-LAN Bridging Settings

5. In the 'Bridge Filter' section, click the 'New Entry' link. The following screen appears.

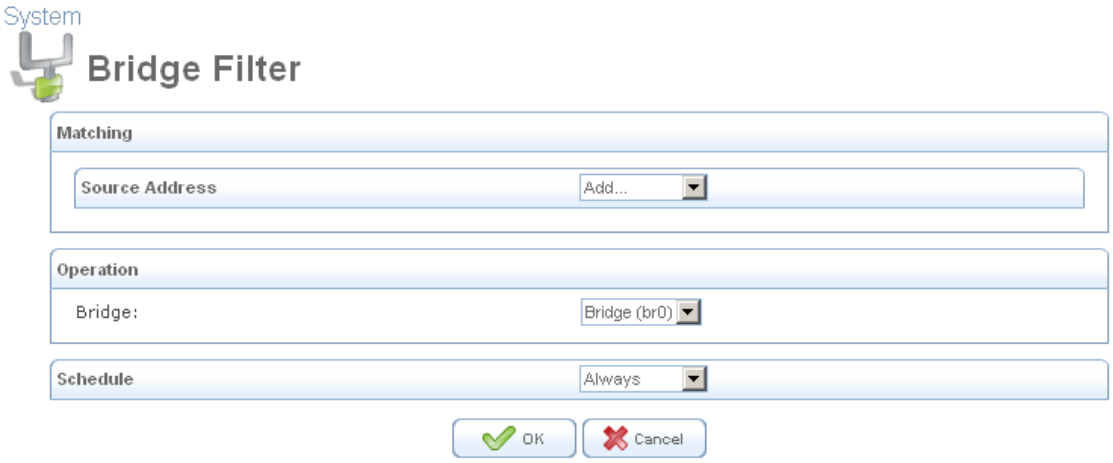


Figure 9-76: Bridge Filter Settings

6. From the drop-down menu in the 'Operation' section, select the WAN-LAN bridge. If not renamed, its default entry appears as "Bridge (br0)".

7. From the 'Source Address' drop-down menu, select 'User Defined'. The 'Edit Network Object' screen appears.

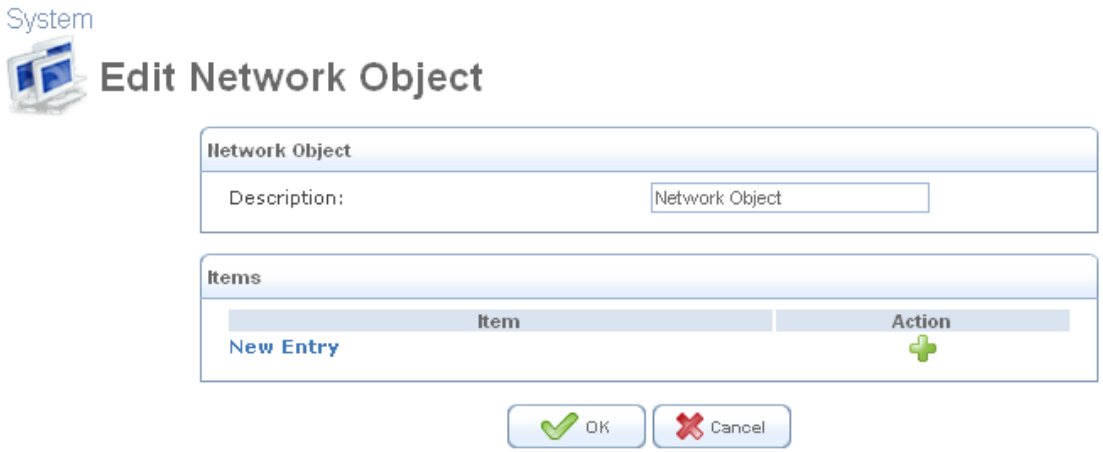


Figure 9-77: Edit Network Object

8. Click the 'New Entry' link. The 'Edit Item' screen appears.

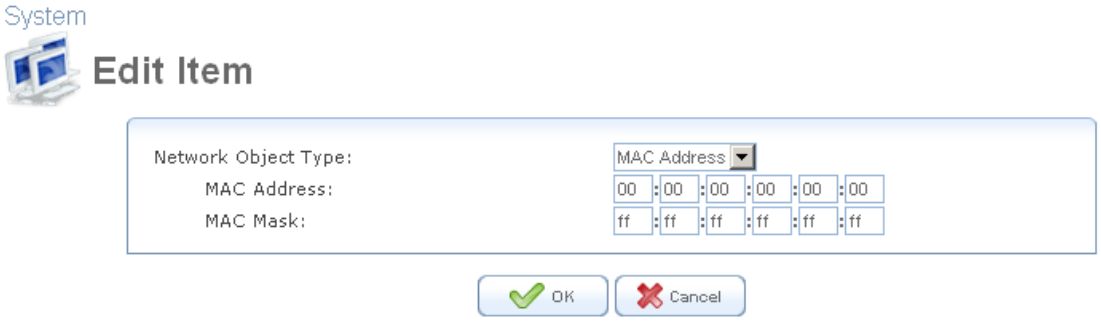


Figure 9-78: Edit Item – MAC Address

This screen enables you to create a traffic filtering rule, which enables direct packet flow between the WAN and the LAN host that will be placed under the WAN-LAN bridge. This filtering rule can be based on either a LAN host's MAC address or one of its DHCP options mentioned earlier.

9. If you wish to base this rule on the MAC address, and enter the MAC address and the MAC mask in their respective fields. Otherwise, perform the following:

a. From the 'Network Object Type' drop-down menu, select 'DHCP Option'. The screen refreshes, changing to the following.

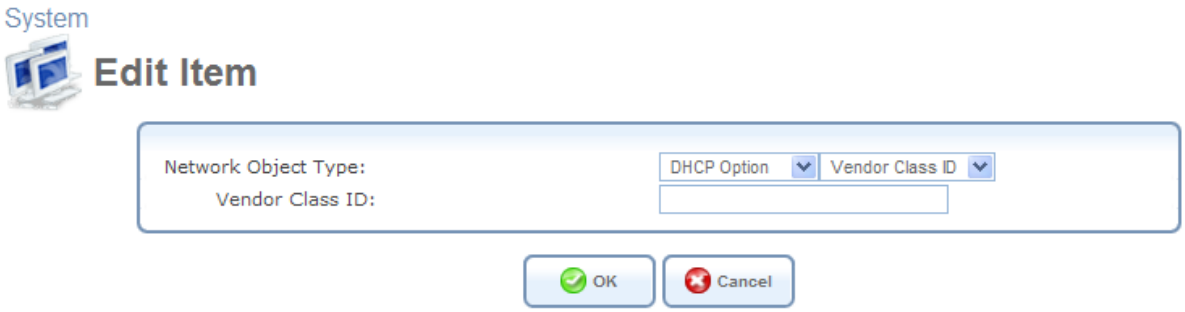


Figure 9-79: Edit Item – DHCP Options

b. From the designated drop-down menu, select one of the DHCP options. The field below changes accordingly.

c. Enter a relevant value for the DHCP option (should be supplied by a service provider).

d. Click 'OK' to save the settings.

9.4.10.3 General

To view and edit the Network Bridging connection settings, click the 'Bridge' link in the 'Network Connections' screen (see Figure 9-11). The 'Bridge Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

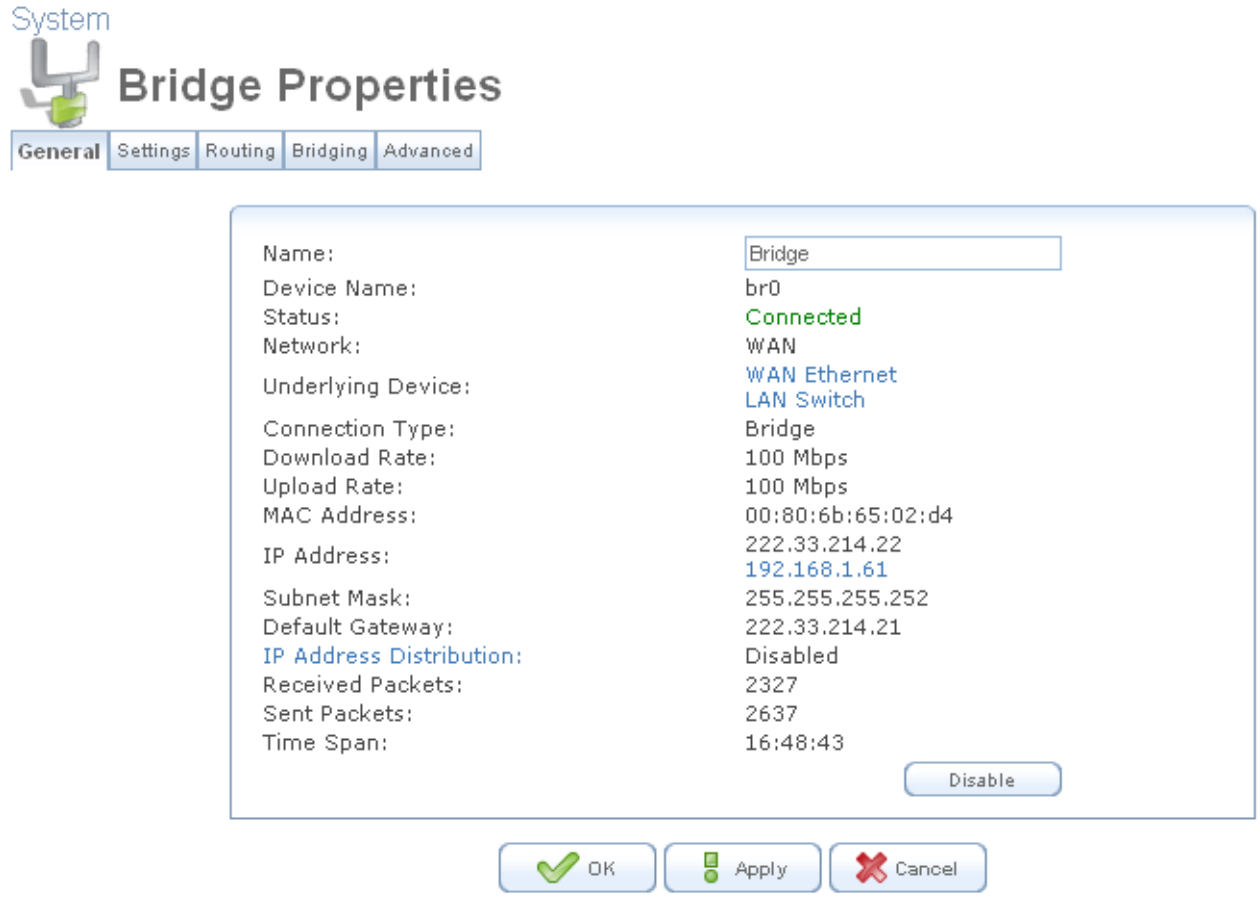


Figure 9-80: Bridge Properties

9.4.10.4 Settings

This section displays the connection's general parameters.

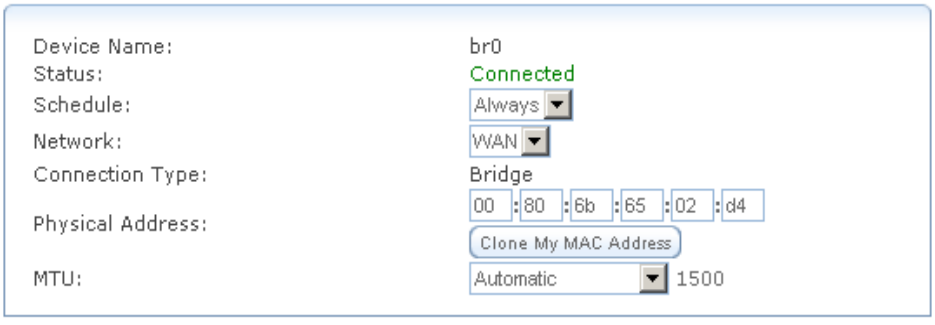


Figure 9-81: Bridge Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

Physical Address The physical address of the Ethernet Bridge.

Clone My MAC Address Press this button to copy your PC's current MAC address to the Bridge.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic' to let Watson find the optimal MTU value for your connection. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' drop-down menu:

- No IP Address
- Obtain an IP Address Automatically
- Use the Following IP Address

Note that the screen will refresh to display relevant configuration settings according to your choice.

No IP Address Select 'No IP Address' if you require that your gateway have no IP address. This can be useful if you are working in an environment where you are not connected to other networks, such as the Internet.

Figure 9-82: Internet Protocol – No IP Address

Obtain an IP Address Automatically Your connection is configured by default to act as a DHCP client. You should keep this configuration in case your service provider supports DHCP, or if you are connecting using a dynamic IP address. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead. You can click the 'Release' button to release the current leased IP address. Once the address has been released, the button text changes to 'Renew'. Use the 'Renew' button to renew the leased IP address.

Figure 9-83: Internet Protocol – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

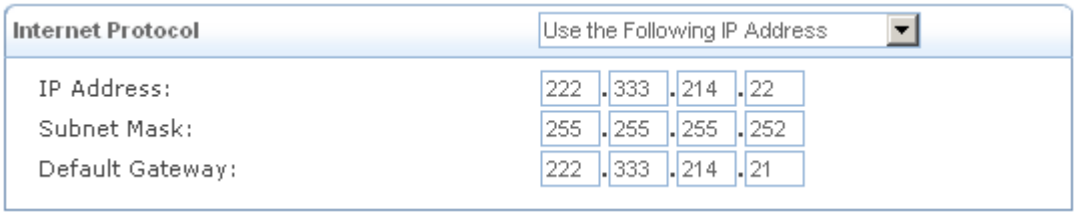

Internet Protocol
Use the Following IP Address
IP Address:
222 . 333 . 214 . 22
Subnet Mask:
255 . 255 . 255 . 252
Default Gateway:
222 . 333 . 214 . 21

Figure 9-84: Internet Protocol – Static IP

DNS Server Domain Name System (DNS) is the method by which Web site domain names are translated into IP addresses. You can configure the connection to automatically obtain a DNS server address, or specify such an address manually, according to the information provided by your ISP. To configure the connection to automatically obtain a DNS server address, select 'Obtain DNS Server Address Automatically' from the 'DNS Server' drop down menu.

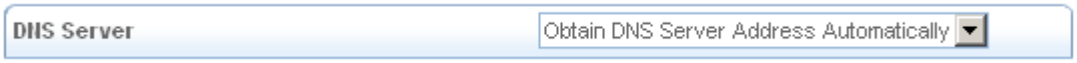


Figure 9-85: DNS Server – Automatic IP

To manually configure DNS server addresses, select 'Use the Following DNS Server Addresses' from the 'DNS Server' drop down menu (see figure 'DNS Server – Static IP'). Specify up to two different DNS server address, one primary, another secondary.

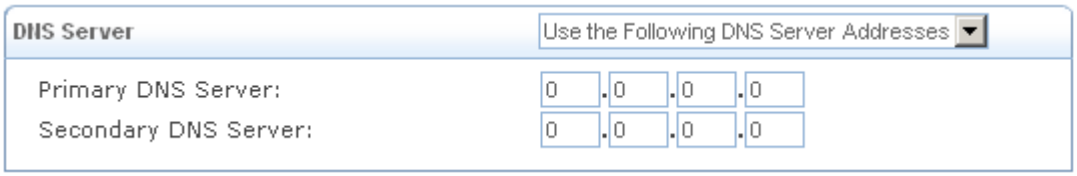


Figure 9-86: DNS Server – Static IP

To learn more about this feature, refer to Section 8.6.1.

IP Address Distribution The 'IP Address Distribution' section allows you to configure the gateway's Dynamic Host Configuration Protocol (DHCP) server parameters. The DHCP automatically assigns IP addresses to network PCs. If you enable this feature, make sure that you also configure your network PCs as DHCP clients. For a comprehensive description of this feature, please refer to Section 8.6.2. Select one of the following options from the 'IP Address Distribution' combo-box:

- **DHCP Server**

  Start IP Address The first IP address that may be assigned to a LAN host. Since the gateway's default IP address is 192.168.1.1, this address must be 192.168.1.2 or greater.

  End IP Address The last IP address in the range that can be used to automatically assign IP addresses to LAN hosts.

  Subnet Mask A mask used to determine to what subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.

  Lease Time In Minutes Each device will be assigned an IP address by the DHCP server for a this amount of time, when it connects to the network. When the lease expires the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses that are not in use will become available for other computers on the network.

  Provide Host Name If Not Specified by Client If the DHCP client does not have a host name, the gateway will automatically assign one for him.

Click 'OK' to save the settings.

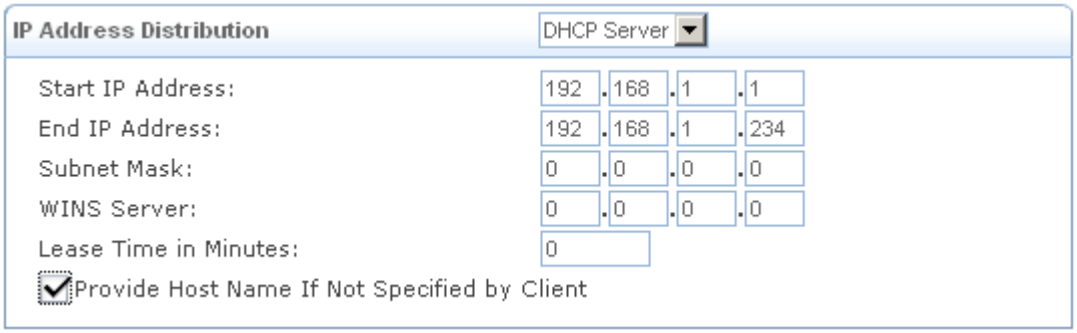

IP Address Distribution
DHCP Server
Start IP Address:
192 . 168 . 1 . 1
End IP Address:
192 . 168 . 1 . 234
Subnet Mask:
0 . 0 . 0 . 0
WINS Server:
0 . 0 . 0 . 0
Lease Time in Minutes:
0
Provide Host Name If Not Specified by Client

Figure 9-87: IP Address Distribution – DHCP Server

- **DHCP Relay** – Your gateway can act as a DHCP relay in case you would like to dynamically assign IP addresses from a DHCP server other than your gateway's DHCP server. Note that when selecting this option you must also change Watson's WAN to work in routing mode. For more information, refer to Section 8.6.2.2.

After selecting 'DHCP Relay' from the drop down menu, a 'New IP Address' link will appear:

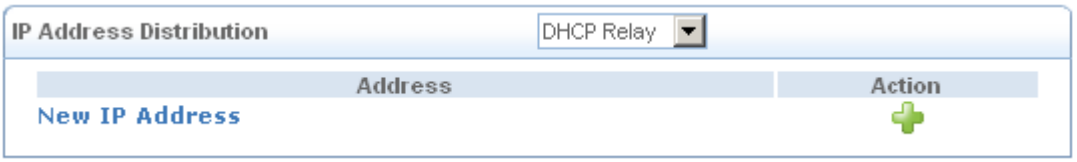


Figure 9-88: IP Address Distribution - DHCP Relay

Click the 'New IP Address' link. The 'DHCP Relay Server Address' screen will appear:

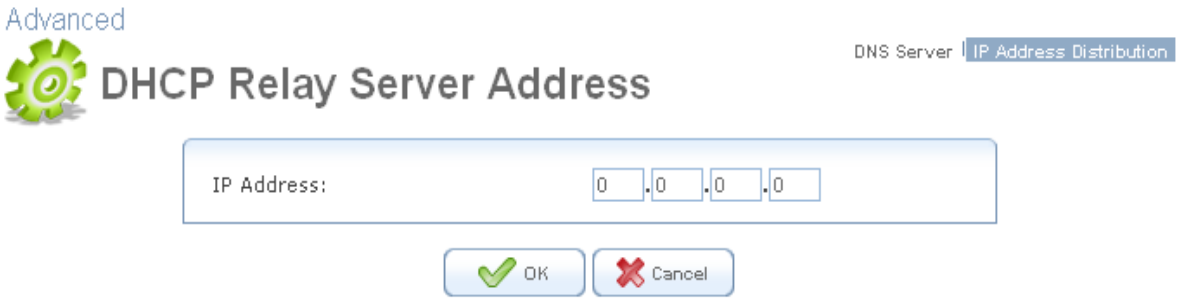


Figure 9-89: DHCP Relay Server Address

Specify the IP address of the DHCP server.

Click 'OK' to save the settings.

- **Disabled** – Select 'Disabled' from the combo-box if you do not want to assign IP addresses to the WAN. This is the standard setting for the WAN interface.

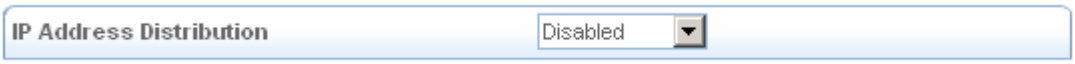


Figure 9-90: IP Address Distribution - Disable DHCP

9.4.10.5 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
- **NAPT** Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses multiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

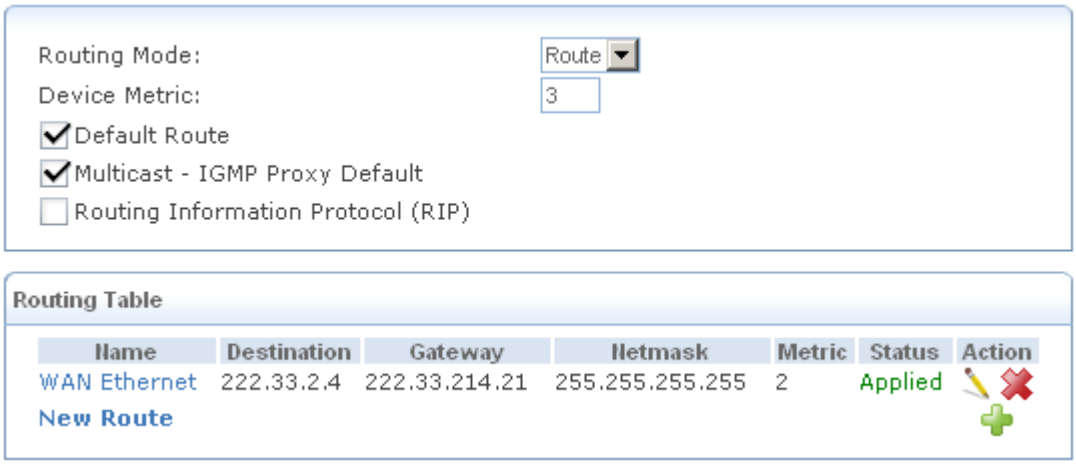


Figure 9-91: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.10.6 Bridging

This section allows you to specify the devices that you would like to join under the network bridge. Click the action icon under the 'VLANs' column to assign the network connections to specific virtual LANS. Select the 'STP' check box to enable the Spanning Tree Protocol on the device. You should use this to ensure that there are no loops in your network configuration, and apply these settings in case your network consists of multiple switches, or other bridges apart from those created by the gateway.

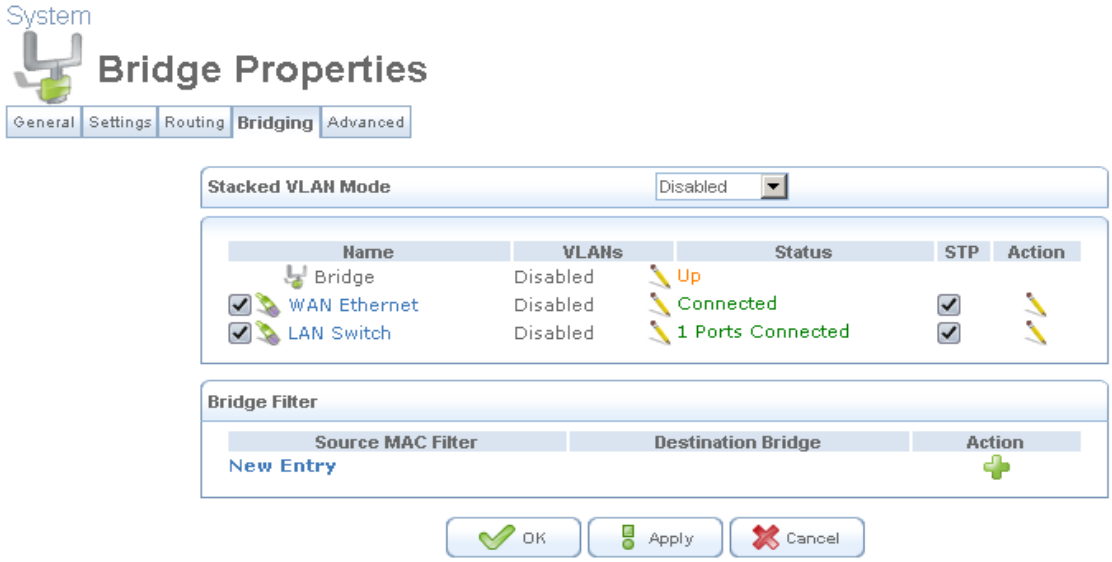


Figure 9-92: Bridge Settings

9.4.10.7 Stacked VLAN Mode

A service provider can use VLAN stacking to allow it to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network.

Use VLAN stacking to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames ("double-tagged" frames) , the service provider can manage up to 4,094 VLAN groups with each group containing up to 4,094 customer VLANs. This allows a service provider to provide different service, based on specific VLANs, for many different customers.

A service provider's customer may require a range of VLANs to handle multiple applications. A service provider's customer can assign his own inner VLAN tags on ports for these applications. The service provider can assign an outer VLAN tag for each customer. Therefore, there is no VLAN tag overlap among customers, so traffic from different customers is kept separate.

The bridging section allows you to select the VLAN stacking mode:

Stacked VLAN Mode Select one of the following Stacked VLAN Mode options from the drop-down menu:

- Disabled
- Rule Based
- Transparent
- Port Based

Note that the screen will refresh to display relevant configuration settings according to your choice.

Disabled Select ‘Disabled' if you you want to turn off stacked VLAN mode.

Transparent Select ‘Transparent’ if you want to enable VLAN stacked frames (“double-tagged” frames) to be transparently bridged through the device

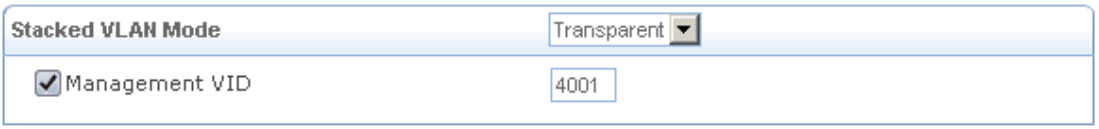


Figure 9-93: Transparent Mode

The ‘Management VID’ defines the VLAN ID of the outer VLAN which is reserved for managing the device.

Rule Based Select ‘Rule Based’ if you want to add an outer VLAN tag to frames which match a set of rules.

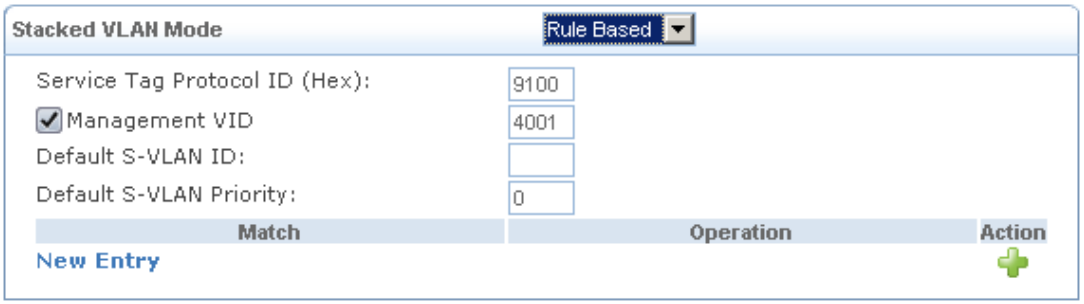


Figure 9-94: Stacked VLAN Mode

The **'Service Tag Protocol ID'** defines the VLAN TPID of the outer tag. According to the IEEE 802.1ad standard the value shall be 0x88a8. But in order to allow backwards compatibility with older VLAN stacking equipments the value can be defined to any other value.

The **'Management VID'** defines the VLAN ID of the outer VLAN which is reserved for managing the device.

The **'Default S-VLAN ID'** defines the default VLAN ID of the outer tag (Service Provider tag) which will be added to untagged or VLAN tagged frames.

The **'Default S-VLAN Priority'** defines the default VLAN Priority of the outer tag (Service Provider tag) which will be added to untagged or VLAN tagged frames.

Note: Before to add a Rule based S-VLAN you need to validate the new mode by clicking the 'Apply' or the 'Ok' button. But before to do this you need to make sure that you have already created a Management VLAN and have also assigned it another Ethernet IP address. Refer to section 9.4.11to learn how to create a VLAN interface. After clicking the 'Apply' or 'Ok' button you will loose access to the management. Reconfigure your network to use the management VLAN and connect to the management using the new management IP address..

To define a VLAN stacking rule, click the 'New Entry' link, the 'Rule Settings' screen appears:

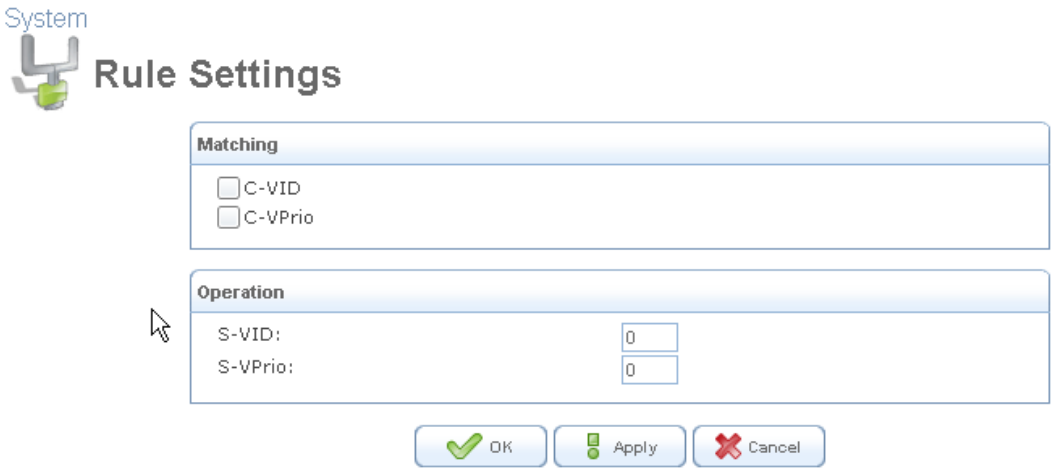


Figure 9-95: Rule Settings

This screen is divided into two main sections, 'Matching' and 'Operation'. The 'Matching' section let's you select which C-VLAN (Customer VLAN) is going to be doubled tagged. The S-VLAN (Provider VLAN) which will be added is defined in the 'Operation' section.

Matching Use this section to define the customer VLAN (C-VLAN) matching the rule

- **C-VID** The customer C-VLAN ID
- **C-Vprio** The customer C-VLAN priority

Operation Use this section to define the provider VLAN (S-VLAN) to be added to the packets matching the rule

- **S-VID** The provider S-VLAN ID
- **S-Vprio** The customer S-VLAN priority

Port Based Select 'Port Based' if you want to add an outer VLAN tag based on the LAN Switch Port number.

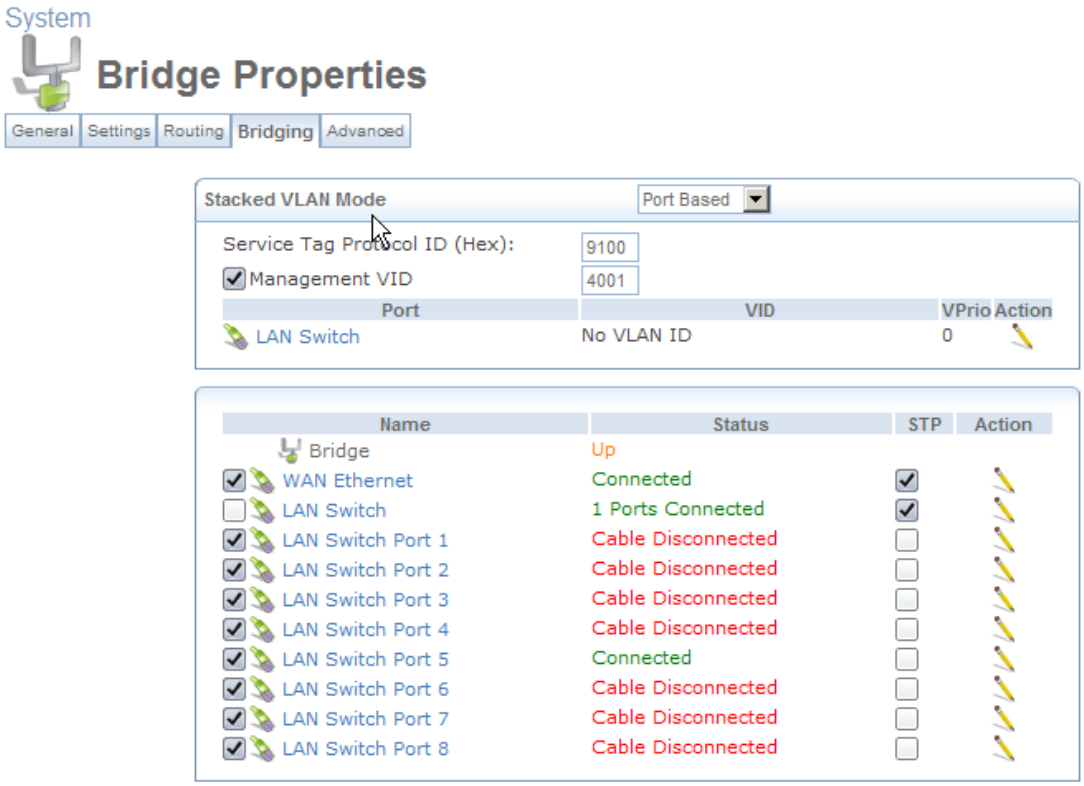


Figure 9-96: Port Based Mode

The '**Service Tag Protocol ID'** defines the VLAN TPID of the outer tag. According to the IEEE 802.1ad standard the value shall be 0x88a8. But in order to allow backwards compatibility with older VLAN stacking equipments the value can be defined to any other value.

The **'Management VID'** defines the VLAN ID of the outer VLAN which is reserved for managing the device.

Click the apply button and reconnect using a pre-configured management VLAN

interface (see Chapter 9.4.11). After reconnection the LAN Switch Ports appears in the Stacked VLAN mode table. For each LAN Switch Port the default provider S-VLAN ID and S-VLAN Priority can be defined.

The **'VID'** defines the default VLAN ID of the outer tag (Service Provider tag) which will be added to frames ingressing the selected LAN Switch Port.

The **'VPrio'** defines the default VLAN Priority of the outer tag (Service Provider tag) which will be added to frames ingressing the selected LAN Switch Port.

9.4.10.8 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-97: Internet Connection Firewall

Additional IP Addresses You can add alias names (additional IP addresses) to the gateway by clicking the 'New IP Address' link. This enables you to access the gateway using these aliases in addition to the 192.168.1.1.

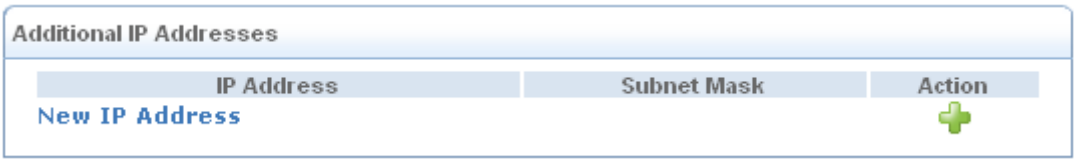


Figure 9-98: Additional IP Addresses

9.4.11 Virtual LAN Interface (VLAN)

Watson allows you to create Virtual LAN (VLAN) interfaces in order to connect to external virtual networks.

To configure the Ethernet Switch for VLAN operation refer to section **Error! Reference source not found.**.

9.4.11.1 Creation with the Connection Wizard

To create a new VLAN interface, perform the following steps:

In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).

Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).

1. Select the 'VLAN Interface' radio button and click 'Next'. The 'VLAN Interface' screen appears.

Figure 9-99: VLAN Interface

2. Select the underlying device for this interface. The drop-down menu will display Watson's Ethernet connections.
3. Enter a value that will serve as the VLAN ID, and click 'Next'. The 'Connection Summary' screen appears.

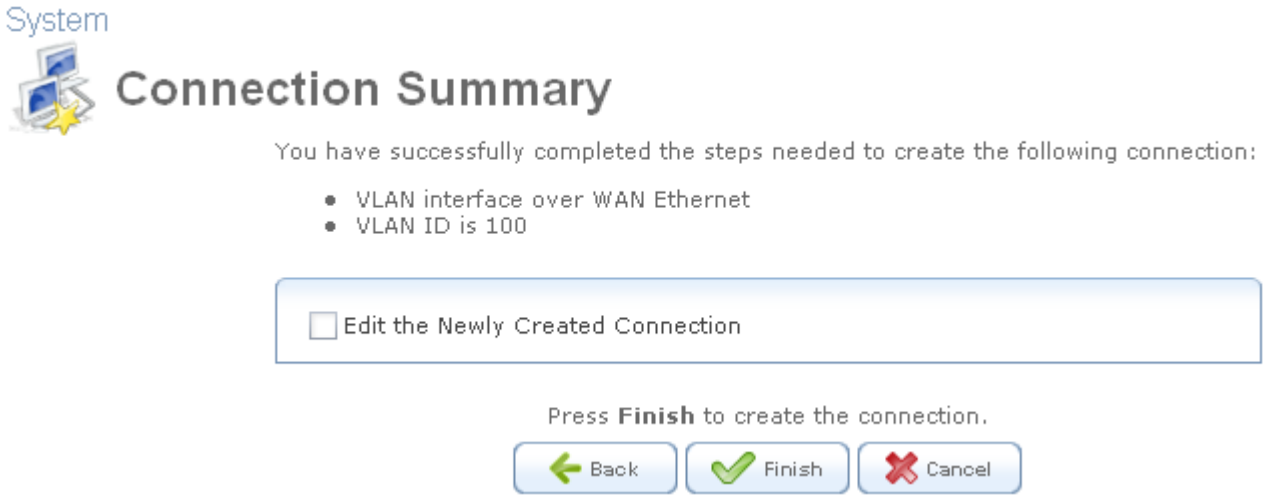


Figure 9-100: Connection Summary

4. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the new connection's configuration screen after clicking 'Finish'. This screen is described later in this chapter.
5. Click 'Finish' to save the settings.

The new VLAN interface will be added to the network connections list, and will be configurable like any other connection.

9.4.11.2 General

To view and edit the VLAN interface settings, click the 'Ethernet VLAN' link in the 'Network Connections' screen (see Figure 9-11). The 'VLAN Properties' screen ap-

pears, displaying a detailed summary of the connection's parameters, under the 'General' sub-tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

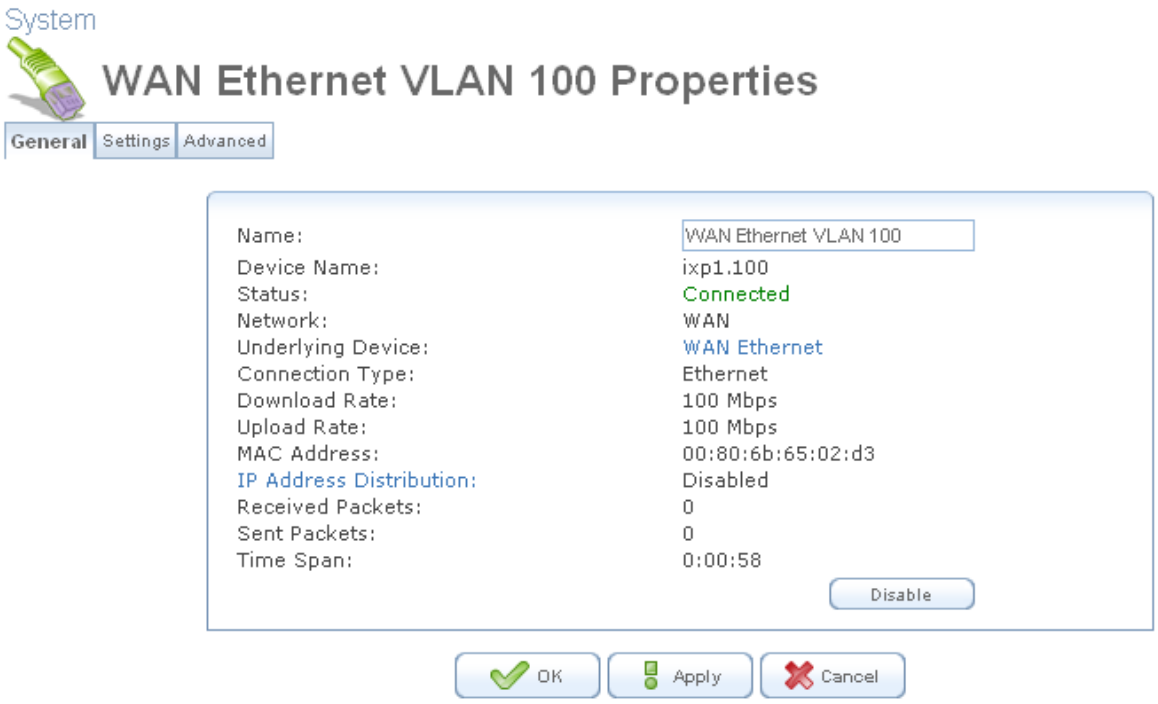


Figure 9-101: VLAN Interface Properties

9.4.11.3 Settings

This section displays the connection's general parameters.

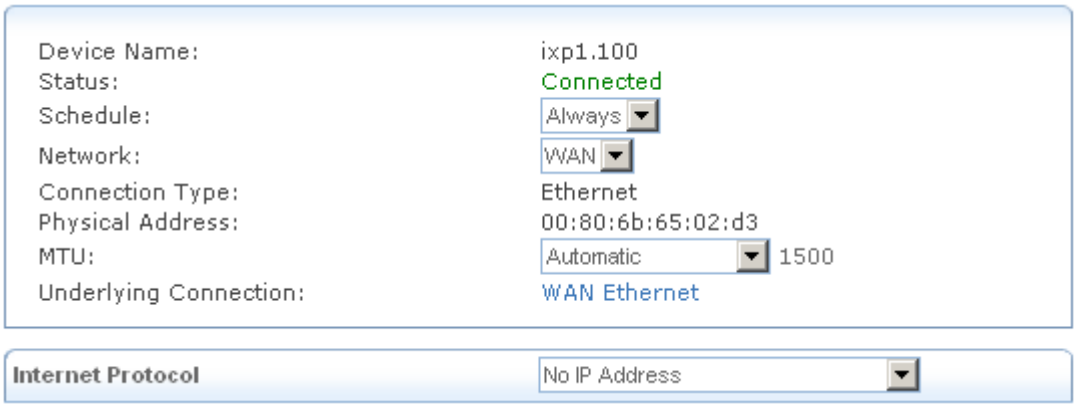


Figure 9-102: VLAN Interface Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

Physical Address The physical address of the Ethernet Bridge.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic' to let Watson find the optimal MTU value for your connection. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' drop-down menu:

- No IP Address
- Obtain an IP Address Automatically
- Use the Following IP Address

Note that the screen will refresh to display relevant configuration settings according to your choice.

No IP Address Select 'No IP Address' if you require that your gateway have no IP address. This can be useful if you are working in an environment where you are not connected to other networks, such as the Internet.

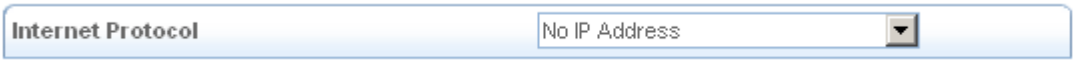


Figure 9-103: Internet Protocol – No IP Address

Obtain an IP Address Automatically Your connection is configured by default to act as a DHCP client. You should keep this configuration in case your service provider supports DHCP, or if you are connecting using a dynamic IP address. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead. You can click the 'Release' button to release the current leased IP address. Once the address has been released, the button text changes to 'Renew'. Use the 'Renew' button to renew the leased IP address.

Figure 9-104: Internet Protocol – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

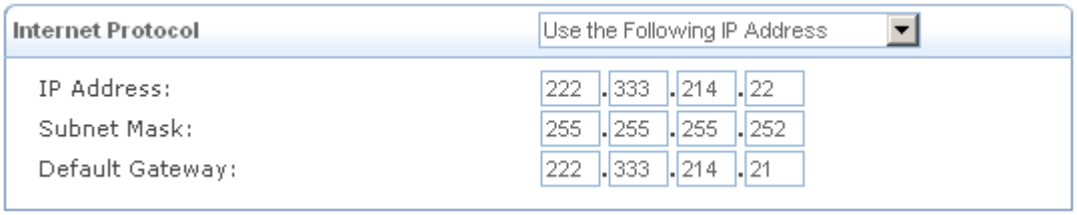

Internet Protocol
Use the Following IP Address
IP Address:
222 . 333 . 214 . 22
Subnet Mask:
255 . 255 . 255 . 252
Default Gateway:
222 . 333 . 214 . 21

Figure 9-105: Internet Protocol – Static IP

9.4.11.4 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

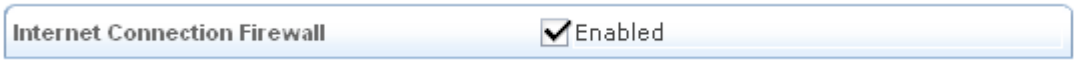


Figure 9-106: Internet Connection Firewall

Additional IP Addresses You can add alias names (additional IP addresses) to the gateway by clicking the 'New IP Address' link. This enables you to access the gateway using these aliases in addition to the 192.168.1.1 .

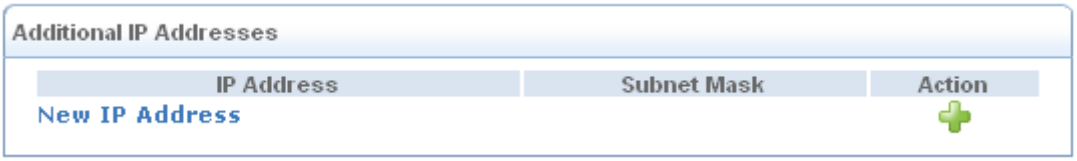


Figure 9-107: Additional IP Addresses

9.4.11.5 DSCP Remark According to 802.1p CoS

When creating a VLAN interface over a LAN connection, it is possible to determine the IP header's Differentiated Services Code Point (DSCP) priority value according to the VLAN header's 802.1p Class of Service (CoS) tag. The DSCP value can then be used for Quality of Service (Qos) traffic prioritization. For more information, refer to Section 8.3.

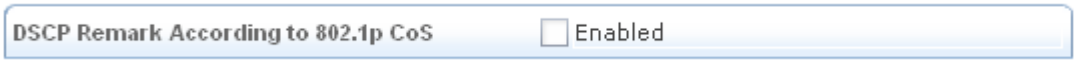


Figure 9-108: DSCP Remark According to 802.1p CoS

1. Select the 'Enabled' check-box. The screen refreshes, displaying the following table.

Figure 9-109: DSCP Remarks Table

2. Click the 'New DSCP Remark' link. The following screen appears.

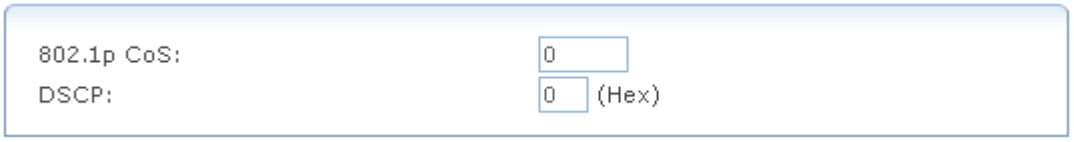


Figure 9-110: DSCP Remark Entry Settings

3. Enter the 802.1p CoS and DSCP values to be associated, and click 'OK'. The new pair of values will appear in the table.
4. Click 'OK' to save the settings.

9.4.12 Point-to-Point Tunneling Protocol (PPTP)

Point-to-Point Tunneling Protocol (PPTP) is a protocol developed by Microsoft targeted at creating VPN connections over the Internet. This enables remote users to access the gateway via any ISP that supports PPTP on its servers. PPTP encapsulates network traffic, encrypts content using Microsoft's Point-to-Point Encryption (MPPE) protocol that is based on RC4, and routes using the generic routing encapsulation (GRE) protocol. With Watson, PPTP is targeted at serving two purposes:

- Connecting Watson to the Internet. Such a connection is established using user name and password authentication.
- Connecting Watson to a remote network using a Virtual Private Network (VPN) tunnel over the Internet. This enables secure transfer of data to another location over the Internet, using user name and password authentication.

9.4.12.1 Creating a PPTP connection with the Connection Wizard

To create a new PPTP connection, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).

3. Select the 'Point-To-Point Tunneling Protocol (PPTP)' radio button and click Next. The 'Point-to-Point Tunneling Protocol (PPTP)' screen appears.

Figure 9-111: Point-to-Point Tunneling Protocol

4. Enter the PPTP server host name or IP address provided by your ISP.
5. Enter the username and password provided by your Internet Service Provider (ISP).
6. Click 'Next'. The 'Connection Summary' screen appears.

Figure 9-112: Connection Summary

7. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the PPTP Properties screen after clicking 'Finish'. This screen is described later in this chapter.
8. Click Finish to save the settings.

The new PPTP connection is added to the network connections list, and is configurable like any other connection.

9.4.12.2 Creating a PPTP VPN connection with the Connection Wizard

To create a new PPTP VPN connection, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the 'Point-To-Point Tunneling Protocol Virtual Private Network (PPTP VPN)' radio button and click Next. The 'Point-to-Point Tunneling Protocol Virtual Private Network (PPTP VPN)' screen appears.

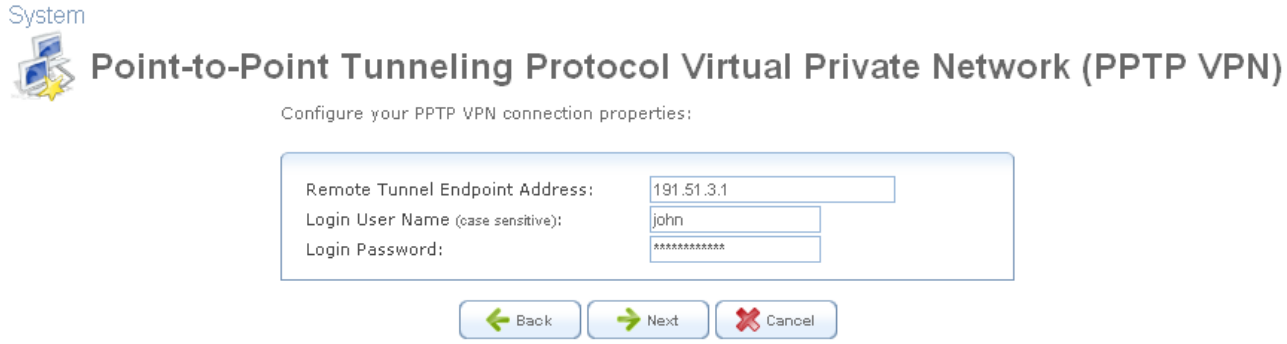


Figure 9-113: PPTP VPN

4. Enter the remote tunnel endpoint address. This would be the IP address or domain name of the remote network computer, which serves as the tunnel's endpoint.
5. Enter the username and password provided by the administrator of the network you are trying to access.
6. Click 'Next'. The 'Connection Summary' screen appear.

Figure 9-114: Connection Summary

7. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the PPTP VPN Properties screen after clicking 'Finish'. This screen is described later in this chapter.

8. Click 'Finish' to save the settings.

The new PPTP VPN connection is added to the network connections list, and is configurable like any other connection.

9.4.12.3 General

To view and edit the PPTP connection settings, click the 'PPTP' link in the 'Network Connections' screen (see Figure 9-11). The 'PPTP Properties' screen appears, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

Figure 9-115: PPTP Properties

9.4.12.4 Settings

This section displays the connection's general parameters.

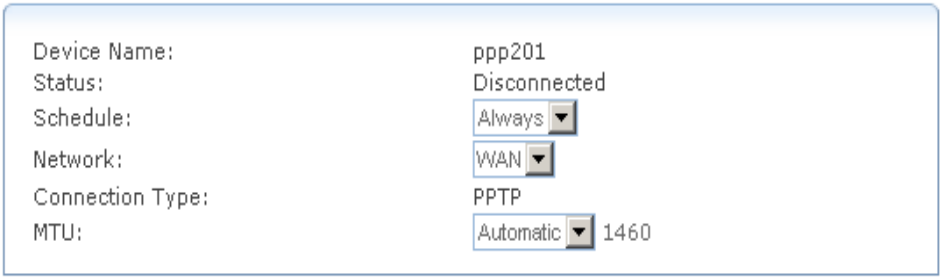


Figure 9-116: General PPTP Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu

will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic' to let Watson find the optimal MTU value for your connection. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol Select one of the following Internet protocol options from the 'Internet Protocol' drop-down menu:

- No IP Address
- Obtain an IP Address Automatically
- Use the Following IP Address

Note that the screen will refresh to display relevant configuration settings according to your choice.

No IP Address Select 'No IP Address' if you require that your gateway have no IP address. This can be useful if you are working in an environment where you are not connected to other networks, such as the Internet.

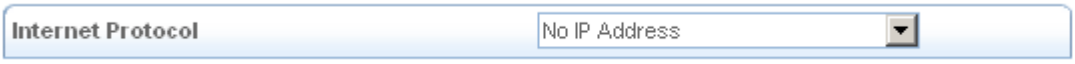


Figure 9-117: Internet Protocol – No IP Address

Obtain an IP Address Automatically Your connection is configured by default to act as a DHCP client. You should keep this configuration in case your service provider supports DHCP, or if you are connecting using a dynamic IP address. The server that assigns the gateway with an IP address, also assigns a subnet mask. You can override the dynamically assigned subnet mask by selecting the 'Override Subnet Mask' and specifying your own mask instead. You can click the 'Release' button to release the current leased IP address. Once the address has been released, the button text changes to 'Renew'. Use the 'Renew' button to renew the leased IP address.

Figure 9-118: Internet Protocol – Automatic IP

Use the Following IP Address Your connection can be configured using a permanent (static) IP address. Your service provider should provide you with such an IP address and subnet mask.

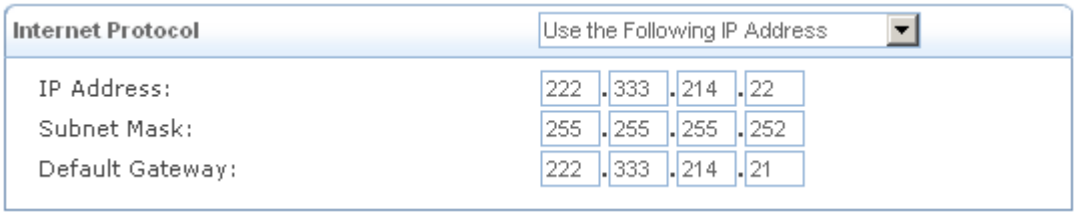

Internet Protocol
Use the Following IP Address
IP Address:
222 . 333 . 214 . 22
Subnet Mask:
255 . 255 . 255 . 252
Default Gateway:
222 . 333 . 214 . 21

Figure 9-119: Internet Protocol – Static IP

DNS Server Domain Name System (DNS) is the method by which Web site domain names are translated into IP addresses. You can configure the connection to automatically obtain a DNS server address, or specify such an address manually, according to the information provided by your ISP. To configure the connection to automatically obtain a DNS server address, select 'Obtain DNS Server Address Automatically' from the 'DNS Server' drop down menu.

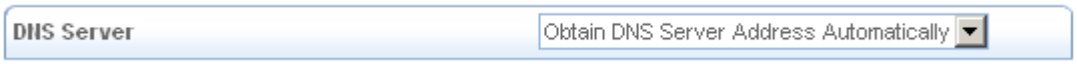


Figure 9-120: DNS Server – Automatic IP

To manually configure DNS server addresses, select 'Use the Following DNS Server Addresses' from the 'DNS Server' drop down menu (see figure 'DNS Server – Static IP'). Specify up to two different DNS server address, one primary, another secondary.

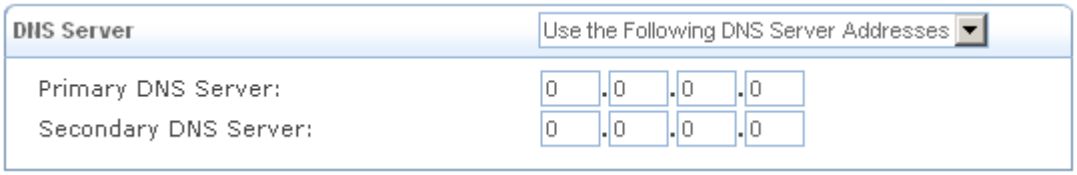


Figure 9-121: DNS Server – Static IP

To learn more about this feature, refer to Section 8.6.1.

9.4.12.5 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
- **NAPT** Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses mul-

tiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

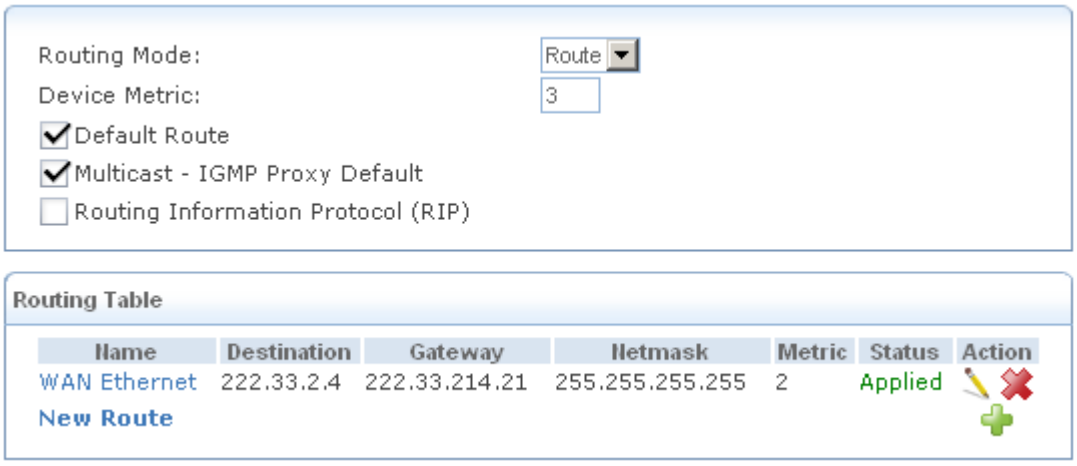


Figure 9-122: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.12.6 PPP

Point-to-Point Protocol (PPP) is the most popular method for transporting packets between the user and the Internet service provider. PPP supports authentication protocols such as PAP and CHAP, as well as other compression and encryption protocols.

PPP-on-Demand Use PPP on demand to initiate the point-to-point protocol session only when packets are actually sent over the Internet.

Time Between Reconnect Attempts Specify the duration between PPP reconnected attempts, as provided by your ISP.

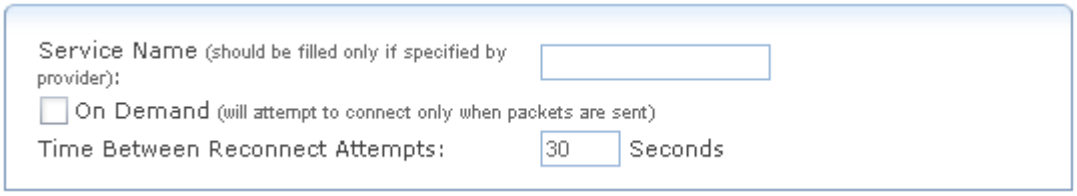

Service Name (should be filled only if specified by provider):
On Demand (will attempt to connect only when packets are sent)
Time Between Reconnect Attempts:
30
Seconds

Figure 9-123: PPP Configuration

PPP Authentication Point-to-Point Protocol (PPP) currently supports four authentication protocols: Password Authentication Protocol (PAP), Challenge Handshake Authentication Protocol (CHAP), and Microsoft CHAP version 1 and 2. This section allows you to select the authentication protocols your gateway may use when negotiating with a PPTP server. Select all the protocols if no information is available about the server's authentication protocols. Note that encryption is performed only if 'Microsoft CHAP', 'Microsoft CHAP version 2', or both are selected.

Figure 9-124: PPP Authentication

Login User Name As agreed with ISP.

Login Password As agreed with ISP.

Support Unencrypted Password (PAP) Password Authentication Protocol (PAP) is a simple, plain-text authentication scheme. The user name and password are requested by your networking peer in plain-text. PAP, however, is not a secure authentication protocol. Man-in-the-middle attacks can easily determine the remote access client's password. PAP offers no protection against replay attacks, remote client impersonation, or remote server impersonation.

Support Challenge Handshake Authentication (CHAP) The Challenge Handshake Authentication Protocol (CHAP) is a challenge-response authentication protocol that uses MD5 to hash the response to a challenge. CHAP protects against replay attacks by using an arbitrary challenge string per authentication attempt.

Support Microsoft CHAP Select this check box if you are communicating with a peer that uses Microsoft CHAP authentication protocol.

Support Microsoft CHAP Version 2 Select this check box if you are communicating with a peer that uses Microsoft CHAP Version 2 authentication protocol.

PPP Encryption PPP supports encryption facilities to secure the data across the network connection. A wide variety of encryption methods may be negotiated, although typically only one method is used in each direction of the link. This section allows you to select the encryption methods your gateway may use when negotiating with a PPTP server. Select all the methods if no information is available about the server's encryption methods. Please note that PPP encryption can only be used with MS-CHAP or MS-CHAP-V2 authentication protocols.

PPP Encryption
Require Encryption (disconnect if server declines)
Support Encryption (40 bit keys)
Support Maximum Strength Encryption (128 bit keys)

Figure 9-125: PPP Encryption

Require Encryption Select this check box to ensure that the PPP connection is encrypted.

Support Encryption (40 Bit Keys) Select this check box if your peer supports 40 bit encryption keys.

Support Maximum Strength Encryption (128 Bit Keys) Select this check box if your peer supports 128 bit encryption keys.

9.4.12.7 PPTP

PPTP Define your ISP's server parameters.

PPTP Server Host Name or IP Address Enter the connection's host name or IP address obtained from your ISP.

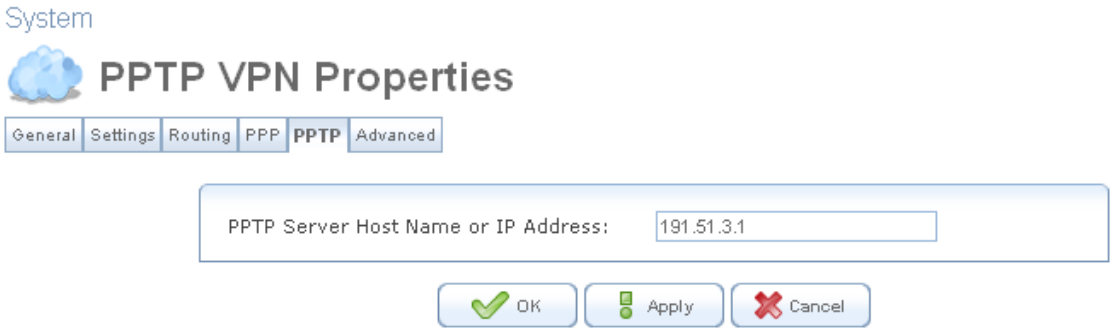


Figure 9-126: PPTP Configuration

9.4.12.8 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-127: Internet Connection Firewall

9.4.13 Point-to-Point Tunneling Protocol Server (PPTP Server)

Watson can act as a Point-to-Point Tunneling Protocol Server (PPTP Server), accepting PPTP client connection requests.

To create a new PPTP Server connection, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the 'Point-To-Point Tunneling Protocol Server (PPTP Server)' radio button and click Next. The 'Point-to-Point Tunneling Protocol (PPTP)' screen appears.

Figure 9-128: Point-to-Point Tunneling Protocol (PPTP)

4. Specify the address range that Watson will reserve for remote users. You may use the default values as depicted in Figure 9-128.

5. Click Next. The 'Connection Summary' screen appears. Note the attention message alerting that there are no users with VPN permissions.

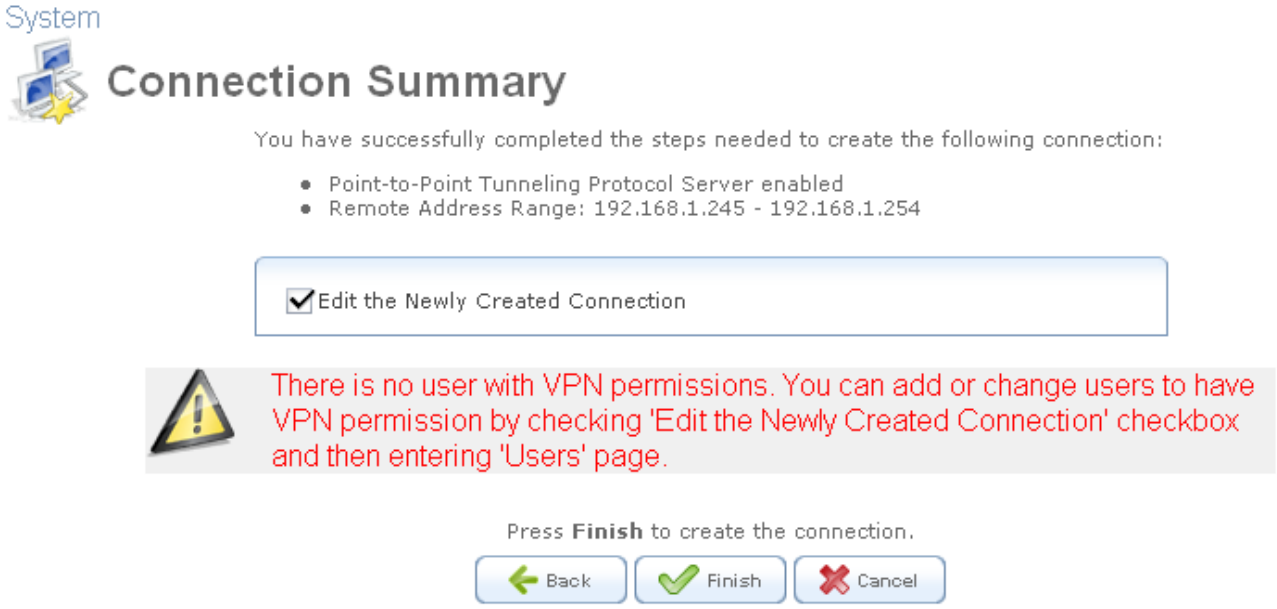

System
Connection Summary
You have successfully completed the steps needed to create the following connection:
Point-to-Point Tunneling Protocol Server enabled
Remote Address Range: 192.168.1.245 - 192.168.1.254
Edit the Newly Created Connection
There is no user with VPN permissions. You can add or change users to have VPN permission by checking 'Edit the Newly Created Connection' checkbox and then entering 'Users' page.
Press Finish to create the connection.
Back
Finish
Cancel

Figure 9-129: Connection Summary

6. Check the 'Edit the Newly Created Connection' check box and click Finish. The 'Point-to-Point Tunneling Protocol Server (PPTP Server)' screen appears:

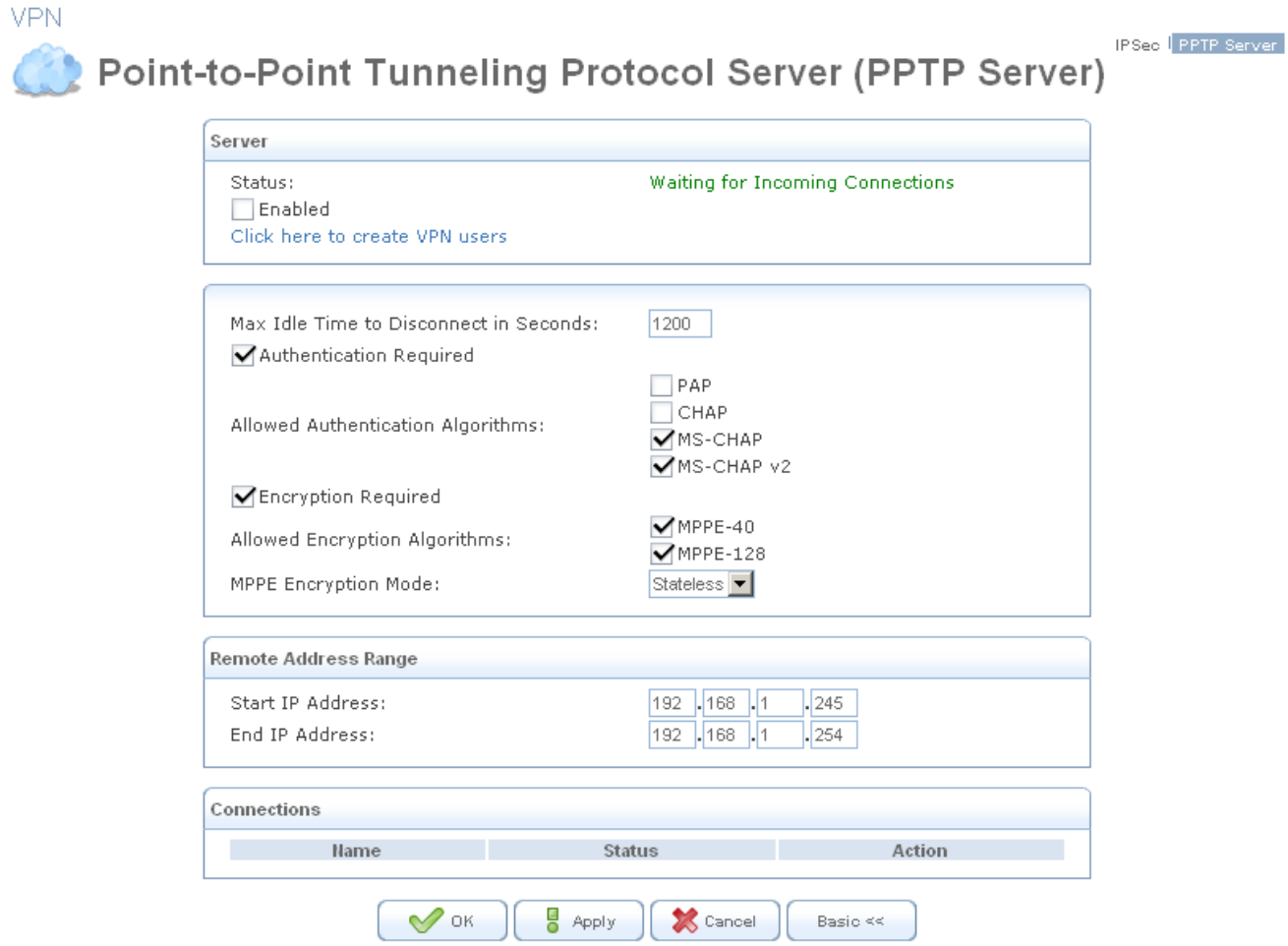


Figure 9-130: Advanced PPTP Server Parameters

7. Click the 'Click Here to Create VPN Users' link to define remote users that will be granted access to your home network. Refer to Section 9.3 to learn how to define and configure users.

8. Click 'OK' to save the settings.

The new PPTP Server will be added to the network connections list, and will be configurable like any connection. Unlike other connections, it is also accessible via the Watson's 'Advanced' screen. To learn more about the configuration of a PPTP server, please refer to Section 8.4.2.

9.4.14 Internet Protocol Security (IPSec)

Internet Protocol Security (IPSec) is a series of guidelines for the protection of Internet Protocol (IP) communications. It specifies procedures for securing private information transmitted over public networks.

To create a new IPSec connection, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).

2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the 'Internet Protocol Security (IPSec)' radio button and click 'Next'. The 'Internet Protocol Security (IPSec)' screen appears.

Figure 9-131: Internet Protocol Security (IPSec)

4. Enter the host or IP address of the destination gateway.
5. Select the method for specifying the remote IP address, which serves as the tunnel's endpoint. Use "Same as Gateway" when connecting your LAN to a remote gateway. When connecting your LAN to a remote network (a group of computers beyond a gateway), use one of the remaining three options. Also, use the transport encapsulation type in a gateway-to-gateway scenario only. Upon selection of an option, the screen will refresh providing you with the appropriate fields for entering the data.
    a. Same as Gateway - the default option that uses the gateway IP entered above. When selecting this option, you must also select the encapsulation type, tunnel or transport, from its combo box.
    b. IP Address - a 'Remote IP Address' field appears. Specify the IP address.
    c. IP Subnet - 'Remote Subnet IP Address' and 'Remote Subnet Mask' fields appear. Specify these parameters.
    d. IP Range - 'From IP Address' and 'To IP Address' fields will appear. Specify the IP range.
6. Enter the IPSec shared secret, which is the encryption key jointly decided upon with the network you are trying to access.
7. Click 'Next'. The 'Connection Summary' screen will appear.

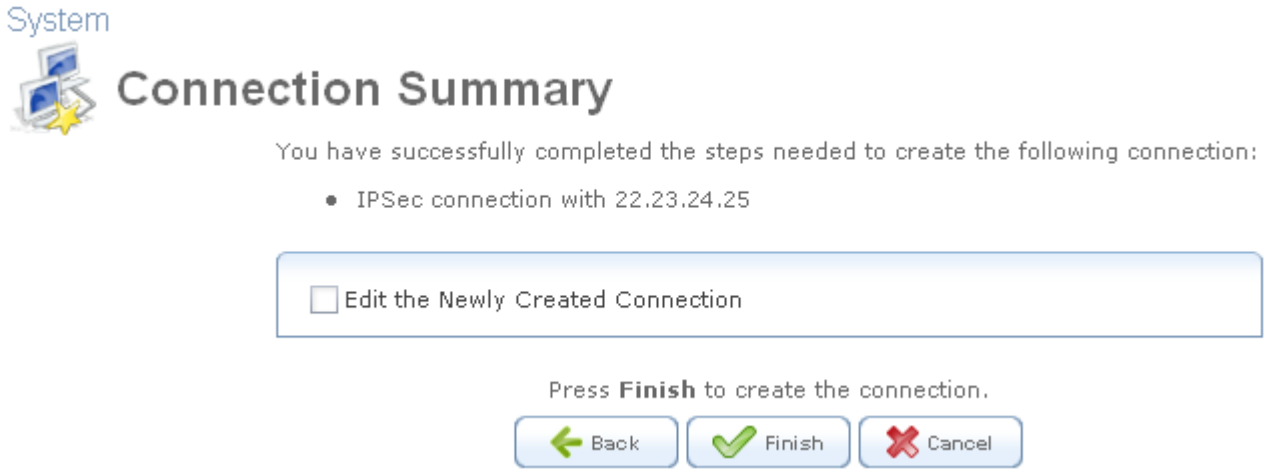


Figure 9-132: Connection Summary

8. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the VPN IPSec Properties screen after clicking 'Finish'.

9. Click 'Finish' to save the settings.

The new IPSec connection will be added to the network connections list, and will be configurable like any connection. Unlike other connections, it is also accessible via the Watson's 'Advanced' screen. To learn more about the configuration of an IPSec connection, please refer to Section 8.4.1.

9.4.15 Internet Protocol Security Server (IPSec Server)

To create a new IPSec Server connection, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).

2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).

3. Select the 'Internet Protocol Security Server (IPSec Server)' radio button and click Next. The 'Internet Protocol Security Server (IPSec Server)' screen appears:

Figure 9-133: Internet Protocol Security Server (IPSec Server)

4. Enter the IPSec shared secret, which is the encryption key jointly decided upon with the network you are trying to access.
5. Click Next. The 'Connection Summary' screen will appear.

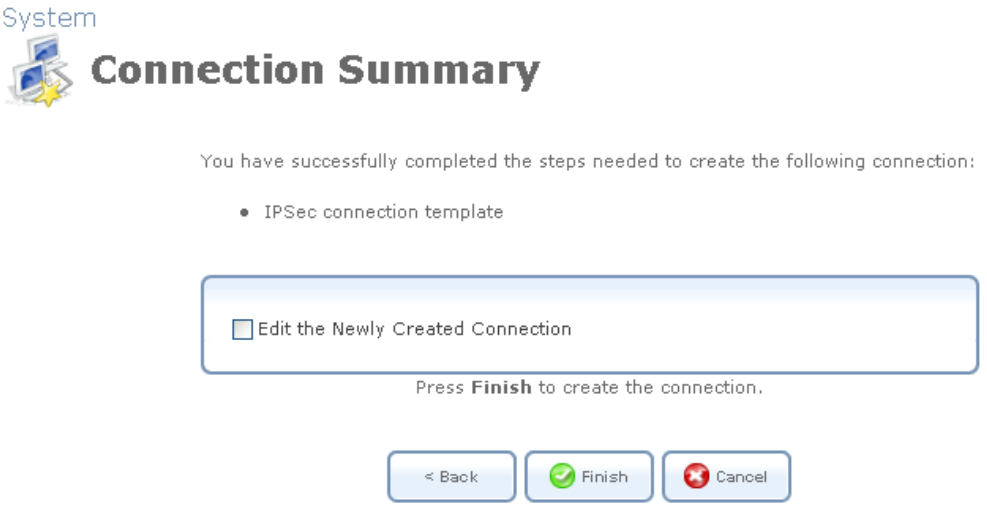


Figure 9-134: Connection Summary

6. Select the 'Edit the Newly Created Connection' check box if you wish to be routed to the ‘VPN IPSec Incoming Connection Properties’ screen after clicking 'Finish'.
7. Click Finish to save the settings.

The new IPSec Server will be added to the network connections list, and will be configurable like any other connection. To learn more about the configuration of an IPSec server, please refer to Section 8.4.1.

9.4.16 Internet Protocol over Internet Protocol (IPIP)

Watson allows you to create an IPIP tunnel to another router, by encapsulating IP packets in IP. This tunnel can be managed as any other network connection. Supported by many routers, this protocol enables using multiple network schemes. Note, however, that IPIP tunnels are not secured.

9.4.16.1 Creation with the Connection Wizard

To create a new IPIP tunnel, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the Internet Protocol over Internet Protocol (IPIP) radio button and click Next. The 'Internet Protocol over Internet Protocol (IPIP)' screen appears:

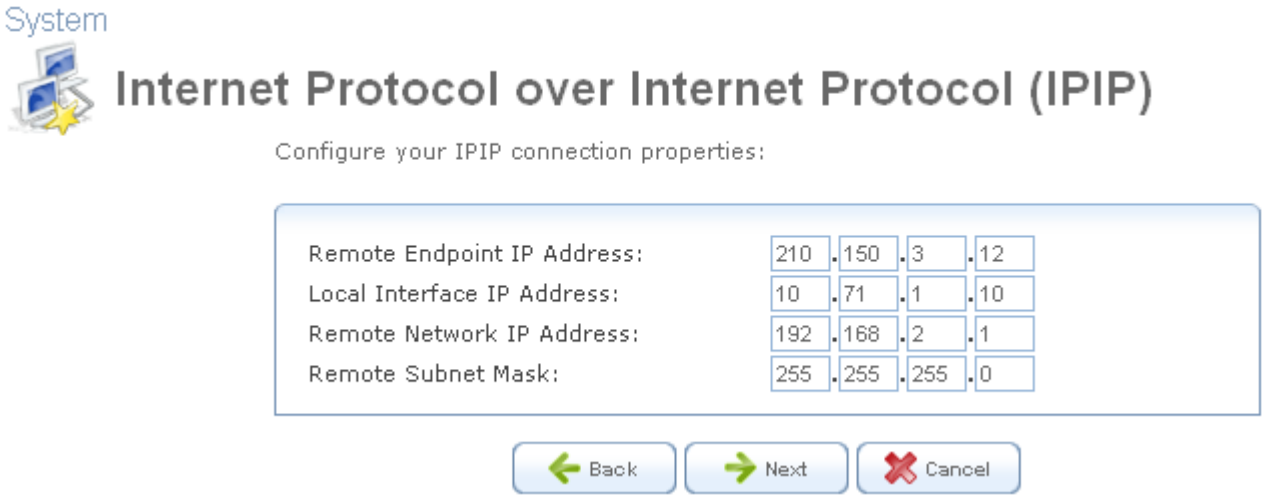

System
Internet Protocol over Internet Protocol (IPIP)
Configure your IPIP connection properties:
Remote Endpoint IP Address: 210 . 150 . 3 . 12
Local Interface IP Address: 10 . 71 . 1 . 10
Remote Network IP Address: 192 . 168 . 2 . 1
Remote Subnet Mask: 255 . 255 . 255 . 0
Back
Next
Cancel

Figure 9-135: Internet Protocol over Internet Protocol (IPIP)

4. Enter the tunnel's remote endpoint IP address.
5. Enter the local IP address for the interface.

6. Enter the IP address and subnet mask of the remote network that will be accessed via the tunnel, and click Next. The 'Connection Summary' screen appears:

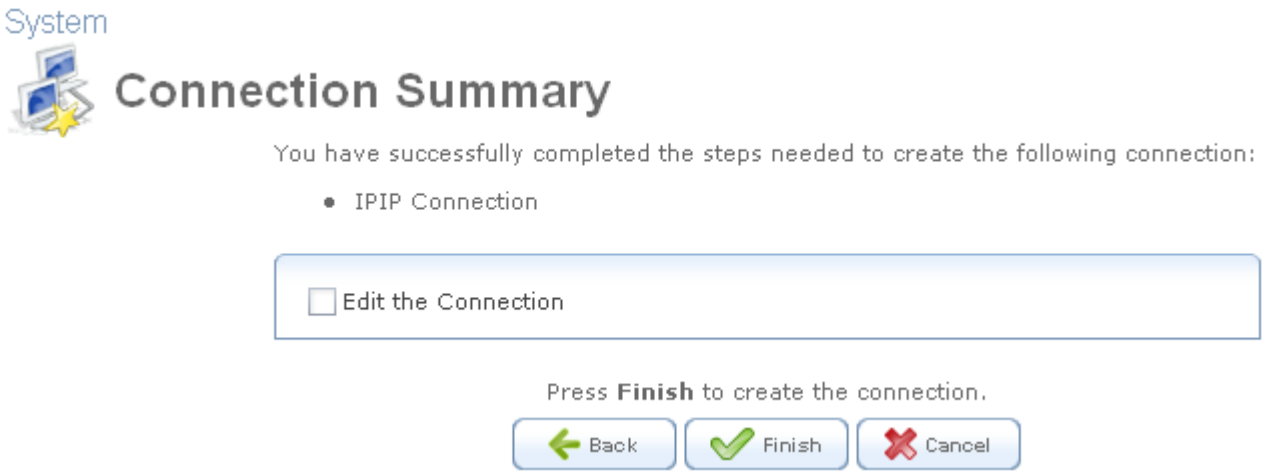


Figure 9-136: Connection Summary

7. Select the 'Edit the Connection' check box if you wish to be routed to the WAN IPIP Properties screen after clicking 'Finish'. This screen is described later in this chapter.

8. Click Finish to save the settings.

The new IPIP tunnel will be added to the network connections list, and will be configurable like any other connection.

9.4.16.2 General

To view and edit the IPIP connection settings, click the 'WAN IPIP' link in the 'Network Connections' screen (see Figure 9-11). The 'WAN IPIP Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

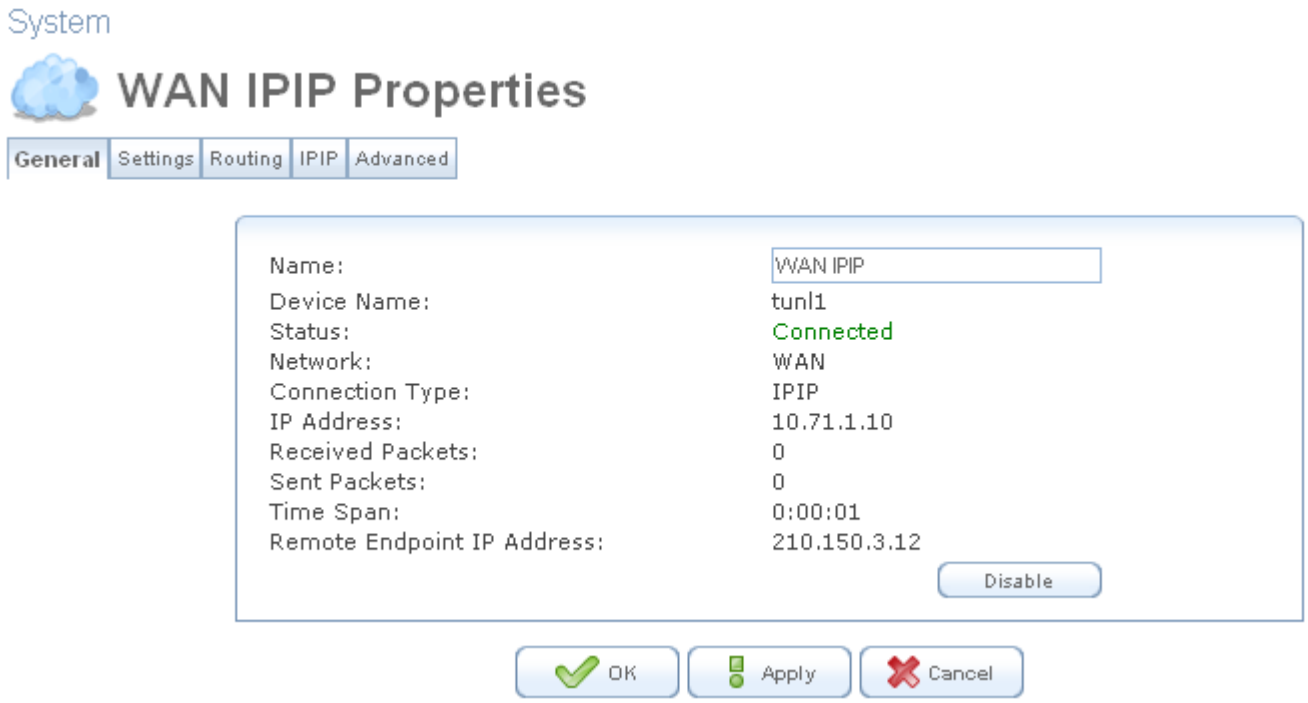


Figure 9-137: WAN IPIP Properties

9.4.16.3 Settings

This section displays the connection's general parameters.

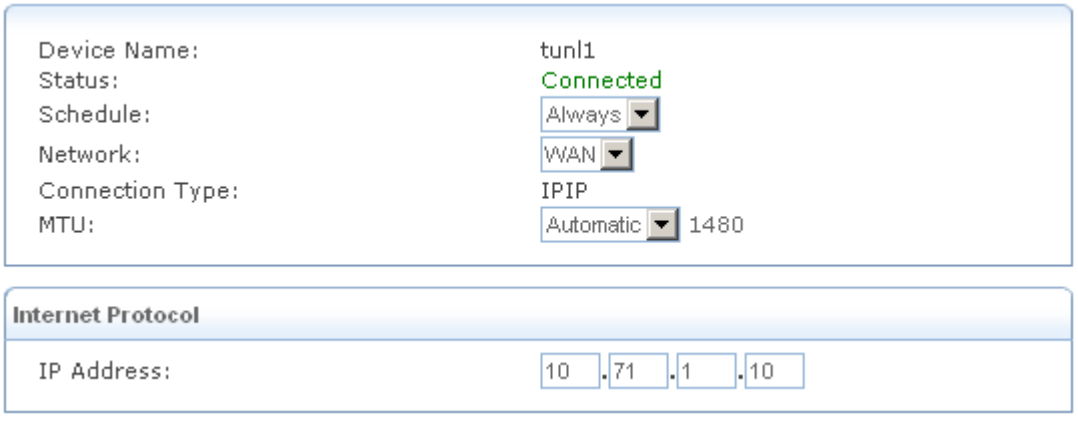


Figure 9-138: WAN IPIP Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu

will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 9.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 9.4.2.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic' to let Watson find the optimal MTU value for your connection. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol The local IP address for the interface.

9.4.16.4 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
- **NAPT** Network Address and Port Translation (NAPT) refers to network address translation involving the mapping of port numbers, allowing multiple machines to share a single IP address. Use NAPT if your LAN encompasses multiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

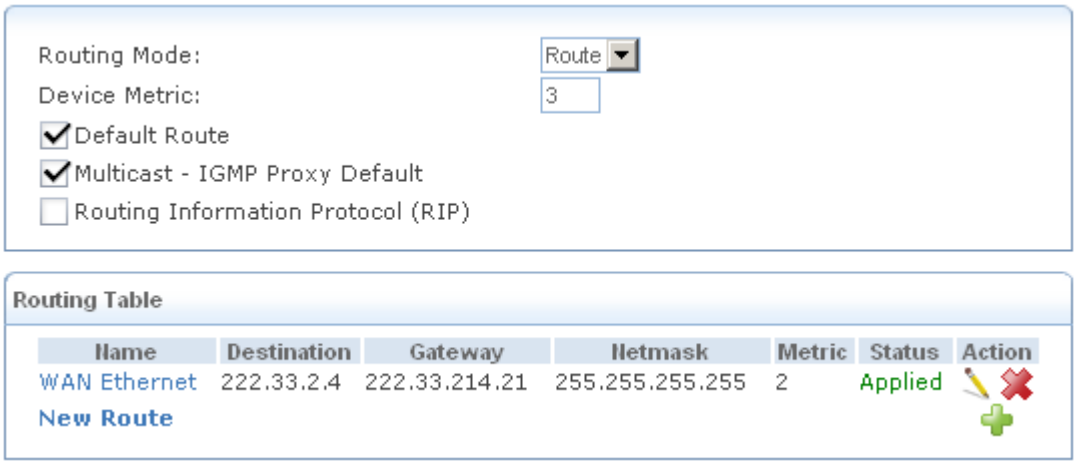


Figure 9-139: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.16.5 IPIP

The tunnel's remote endpoint IP address.

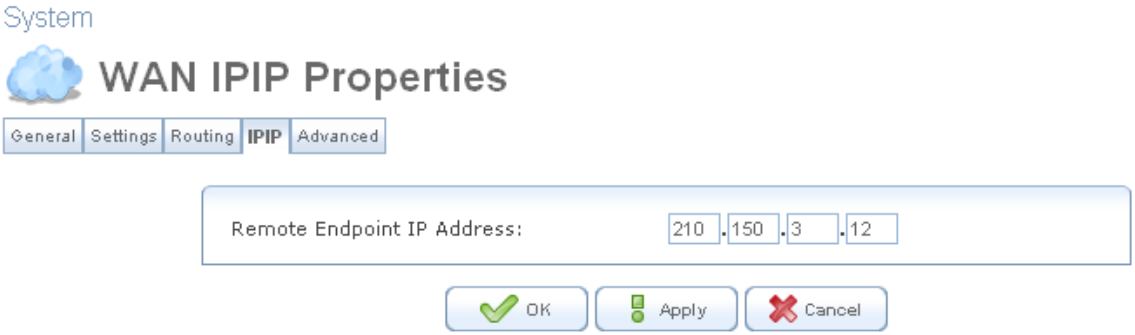


Figure 9-140: IPIP

9.4.16.6 Advanced

Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-141: Internet Connection Firewall

9.4.17 General Routing Encapsulation (GRE)

Watson allows you to create a GRE tunnel in order to transport multicast traffic and IPv6, in addition to other existing tunneling capabilities (e.g. IPIP, PPTP).

9.4.17.1 Creation with the Connection Wizard

To create a new GRE tunnel, perform the following steps:

1. In the 'Network Connections' screen (see Figure 9-11), click the 'New Connection' link. The 'Connection Wizard' screen appears (see Figure 9-12).
2. Select the 'Advanced Connection' radio button and click 'Next'. The 'Advanced Connection' screen appears (see Figure 9-15).
3. Select the General Routing Encapsulation (GRE) radio button and click Next. The 'General Routing Encapsulation (GRE)' screen appears:

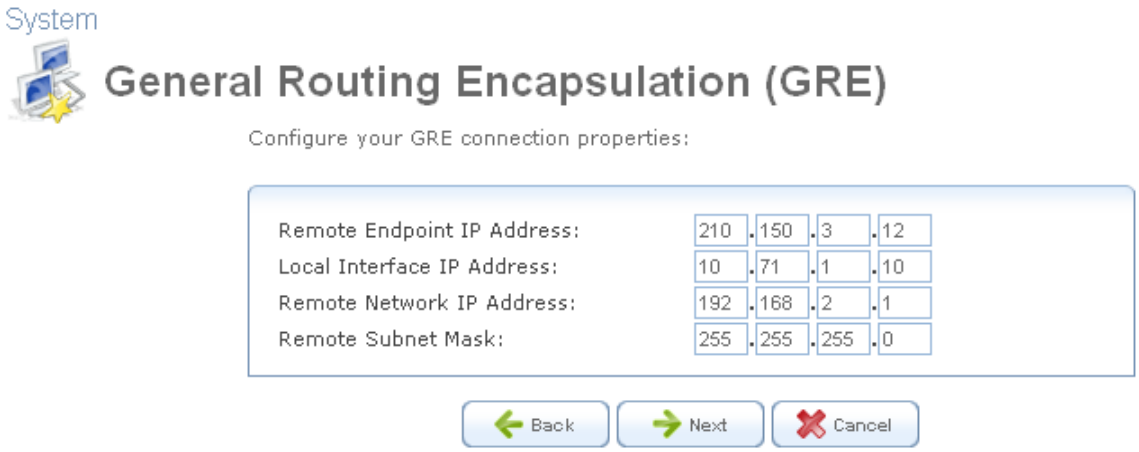

System
General Routing Encapsulation (GRE)
Configure your GRE connection properties:
Remote Endpoint IP Address: 210 . 150 . 3 . 12
Local Interface IP Address: 10 . 71 . 1 . 10
Remote Network IP Address: 192 . 168 . 2 . 1
Remote Subnet Mask: 255 . 255 . 255 . 0
Back
Next
Cancel

Figure 9-142: General Routing Encapsulation (GRE)

4. Enter the tunnel's remote endpoint IP address.
5. Enter the local IP address for the interface.

6. Enter the IP address and subnet mask of the remote network that will be accessed via the tunnel, and click Next. The 'Connection Summary' screen appears:

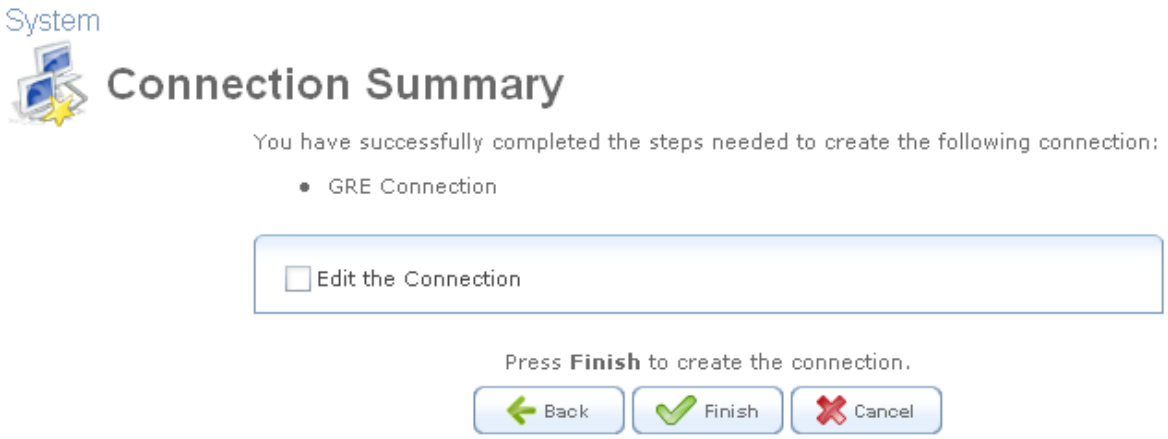


Figure 9-143: Connection Summary

7. Select the 'Edit the Connection' check box if you wish to be routed to the GRE Properties screen after clicking 'Finish'. This screen is described later in this chapter.

8. Click Finish to save the settings.

The new GRE tunnel will be added to the network connections list, and will be configurable like any other connection.

9.4.17.2 General

To view and edit the GRE connection settings, click the 'WAN GRE' link in the 'Network Connections' screen (see Figure 9-11). The 'WAN GRE Properties' screen will appear, displaying a detailed summary of the connection's parameters, under the 'General' tab. These parameters can be edited in the rest of the screen's tabs, as described in the following sections.

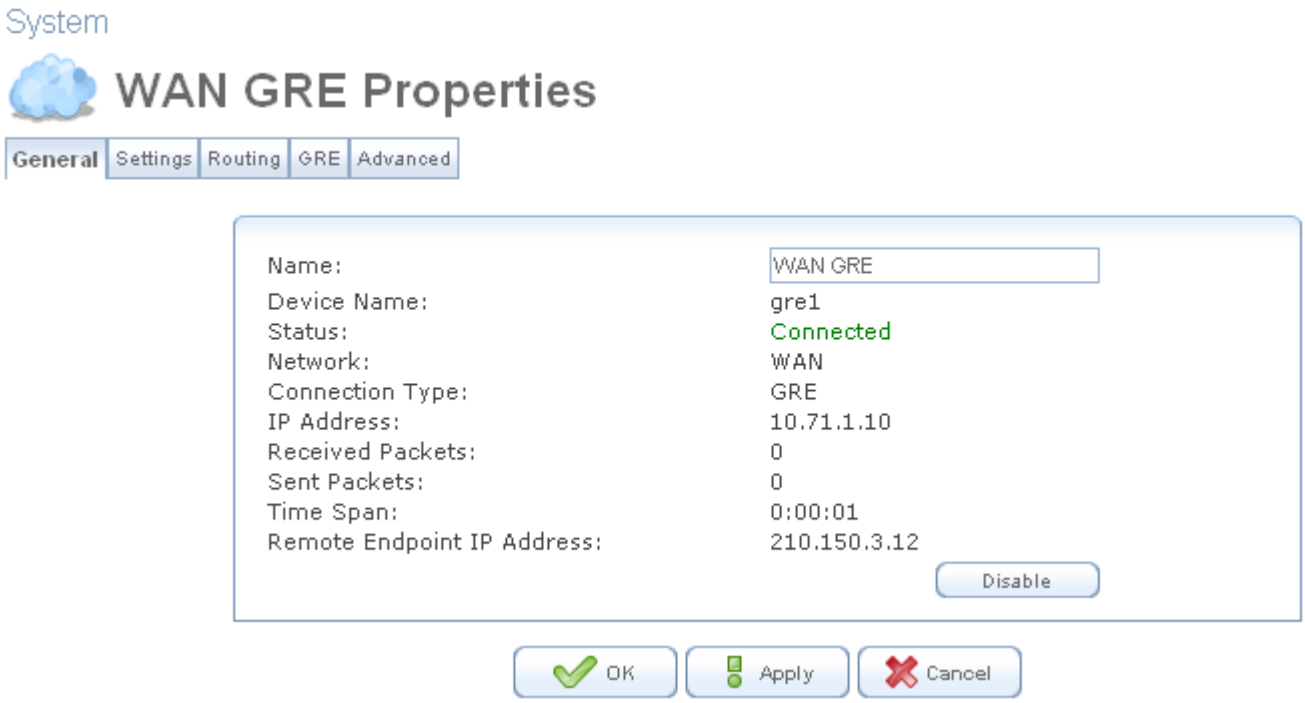


Figure 9-144: WAN GRE Properties

9.4.17.3 Settings

This section displays the connection's general parameters.

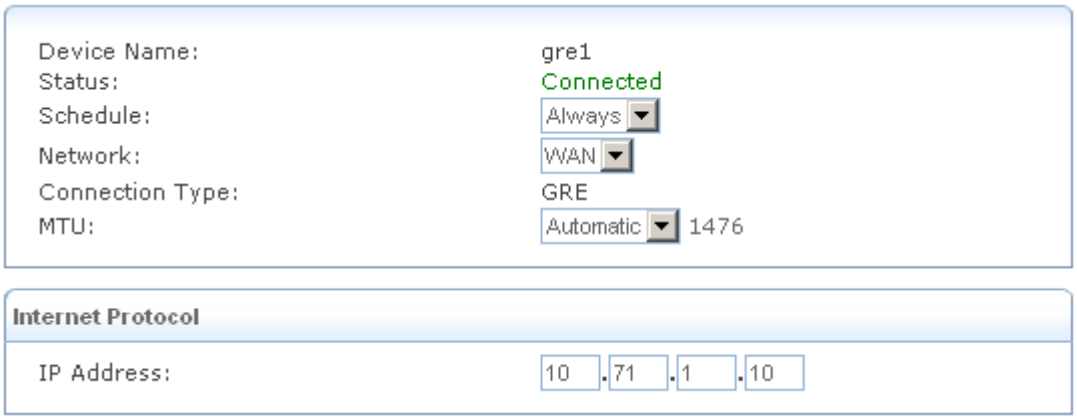


Figure 9-145: WAN GRE Settings

Schedule By default, the connection will always be active. However, you can configure scheduler rules in order to define time segments during which the connection may be active. Once a scheduler rule(s) is defined, the drop-down menu

will allow you to choose between the available rules. To learn how to configure scheduler rules, refer to Section 8.9.3.

Network Select whether the parameters you are configuring relate to a WAN, LAN or DMZ connection, by selecting the connection type from the drop-down menu. For more information, refer to Section 8.4.2.

MTU MTU is the Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. In the default setting, Automatic, the gateway selects the best MTU for your Internet connection. Select 'Automatic by DHCP' to have the DHCP determine the MTU. In case you select 'Manual' it is recommended to enter a value in the 1200 to 1500 range.

Internet Protocol The local IP address for the interface.

9.4.17.4 Routing

You can choose to setup your gateway to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, whereas static routing specifies a fixed routing path to neighboring destinations.

Routing Mode Select one of the following routing modes:

- **Route** Use route mode if you want your gateway to function as a router between two networks.
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Device Metric The device metric is a value used by the gateway to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Select this check box to define this device as a the default route.

Multicast – IGMP Proxy Default IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of LAN devices asking to join multicast groups. Select the 'Multicast IGMP Proxy Default' check box to enable this feature.

Routing Information Protocol (RIP) Select this check box to enable the Routing Information Protocol (RIP). RIP determines a route based on the smallest hop count between source and destination. When RIP is enabled, select the following:

- Listen to RIP messages—select 'None', 'RIPv1', 'RIPv2' or 'RIPv1/2'.
- Send RIP messages—select 'None', 'RIPv1', 'RIPv2-broadcast' or 'RIPv2-multicast'.

Routing Table Allows you to add or modify routes when this device is active. Use the 'New Route' button to add a route or edit existing routes.

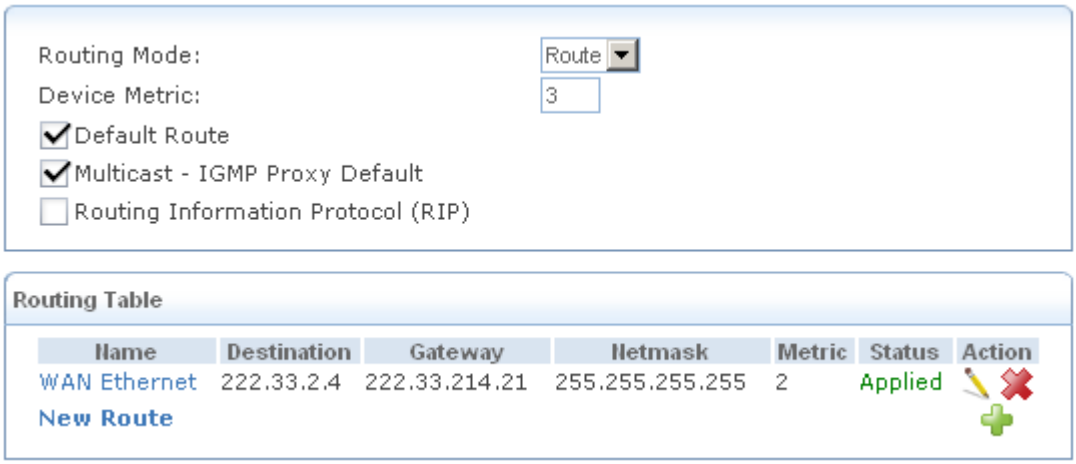


Figure 9-146: Advanced Routing Properties

To learn more about this feature, refer to Section 9.6.1.

9.4.17.5 GRE

The tunnel's remote endpoint IP address.

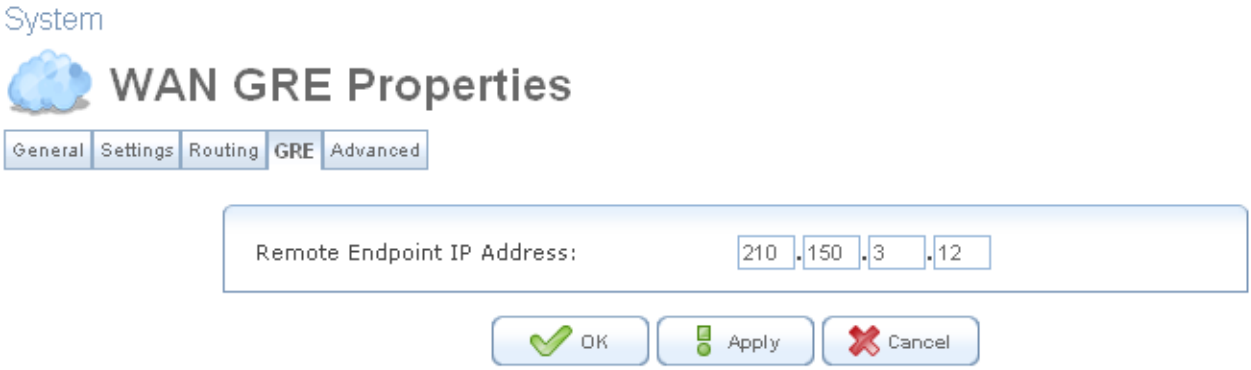


Figure 9-147: GRE

9.4.17.6 Advanced

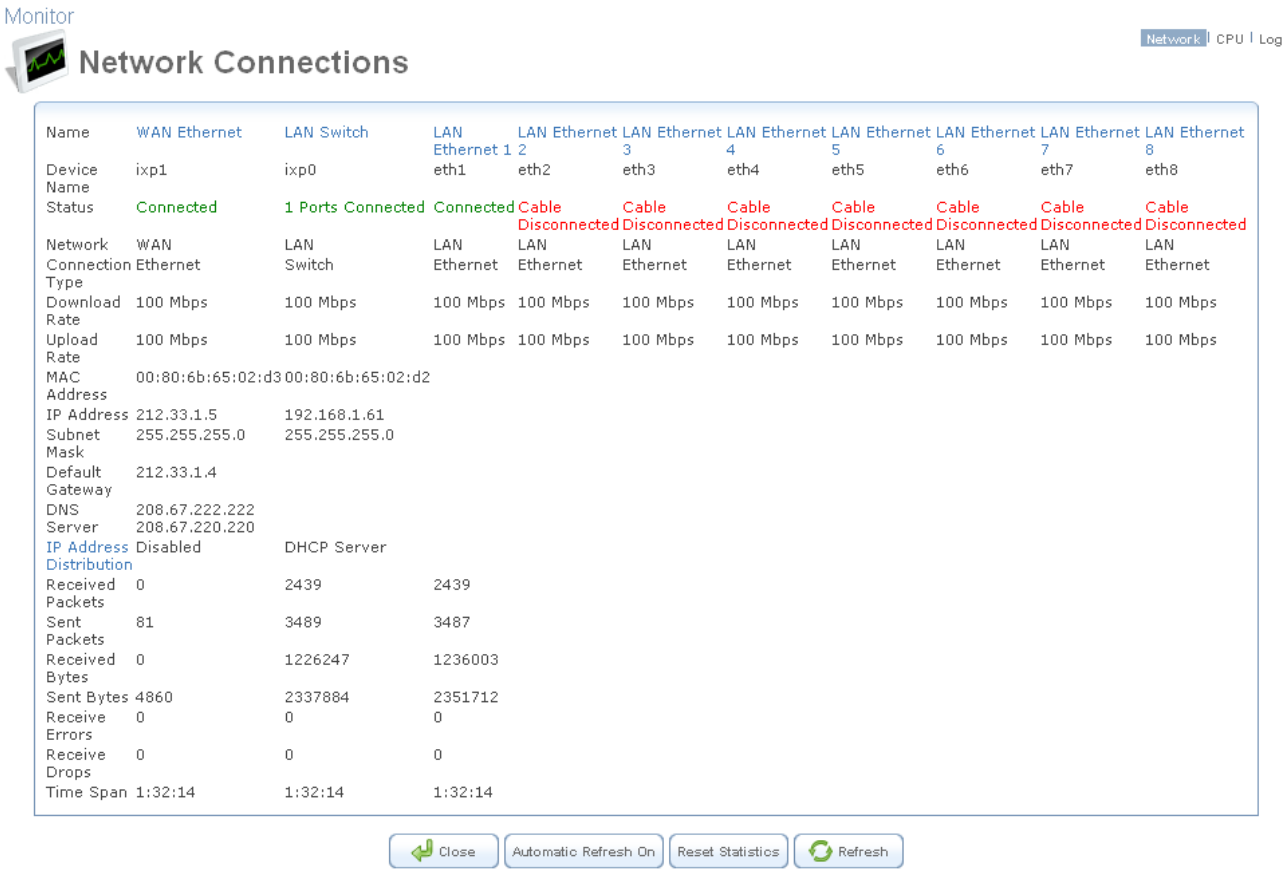
Internet Connection Firewall Your gateway's firewall helps protect your computer by preventing unauthorized users from gaining access to it through a network such as the Internet. The firewall can be activated per network connection. To enable the firewall on this network connection, select the 'Enabled' check box. To learn more about your gateway's security features, refer to Section 8.2.

Figure 9-148: Internet Connection Firewall

9.5 Monitor

9.5.1 Network

The Monitoring screen displays a table summarizing the monitored connection data. Watson constantly monitors traffic within the local network and between the local network and the Internet. You can view statistical information about data received from and transmitted to the Internet (WAN) and to computers in the local network (LAN).



Name	WAN Ethernet	LAN Switch	LAN Ethernet 1	LAN Ethernet 2	LAN Ethernet 3	LAN Ethernet 4	LAN Ethernet 5	LAN Ethernet 6	LAN Ethernet 7	LAN Ethernet 8
Device Name	ixp1	ixp0	eth1	eth2	eth3	eth4	eth5	eth6	eth7	eth8
Status	Connected	1 Ports Connected	Connected	Cable Disconnected	Cable Disconnected	Cable Disconnected	Cable Disconnected	Cable Disconnected	Cable Disconnected	Cable Disconnected
Network Connection Type	WAN Ethernet	LAN Switch	LAN Ethernet	LAN Ethernet	LAN Ethernet	LAN Ethernet	LAN Ethernet	LAN Ethernet	LAN Ethernet	LAN Ethernet
Download Rate	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps
Upload Rate	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps	100 Mbps
MAC Address	00:80:6b:65:02:d3	00:80:6b:65:02:d2								
IP Address	212.33.1.5	192.168.1.61								
Subnet Mask	255.255.255.0	255.255.255.0								
Default Gateway	212.33.1.4									
DNS Server	208.67.222.222 208.67.220.220									
IP Address Distribution	Disabled	DHCP Server								
Received Packets	0	2439	2439							
Sent Packets	81	3489	3487							
Received Bytes	0	1226247	1236003							
Sent Bytes	4860	2337884	2351712							
Receive Errors	0	0	0							
Receive Drops	0	0	0							
Time Span	1:32:14	1:32:14	1:32:14							

Figure 9-149: Monitoring Connections

Click the 'Refresh' button to update the display, or press the 'Automatic Refresh On' button to constantly update the displayed parameters.

9.5.2 CPU

The 'CPU' screen displays the amount of time that has passed since the system was last started, and the load average. The load average provides information on the CPU load, by specifying the number of processes that have been in "running" state in average, for the last 1, 5, and 15 minutes.

In addition, this screen displays a list of all the processes currently running on Watson and their virtual memory usage. The screen is automatically refreshed by default, though you may change this by clicking 'Automatic Refresh Off'.

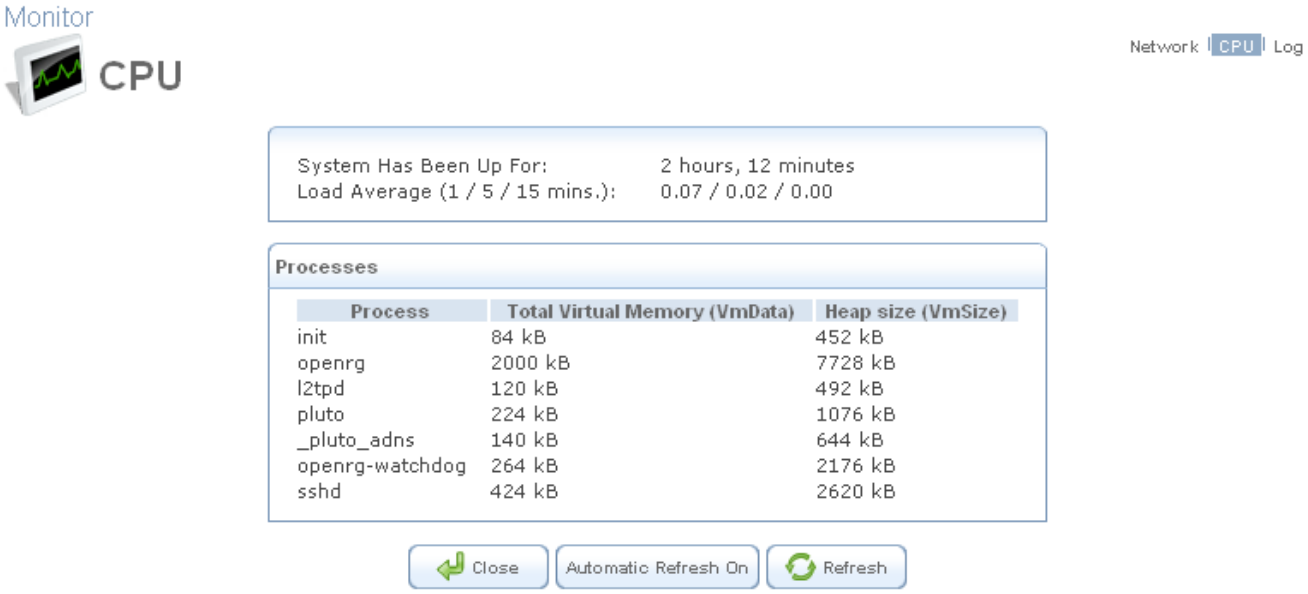


Figure 9-150: CPU Monitoring

9.5.3 Log

The 'System Log' screen displays a list of recent activities that has taken place on Watson. Note that if you would like to view Watson's system log in your host's command prompt, you must install and run the syslog server.

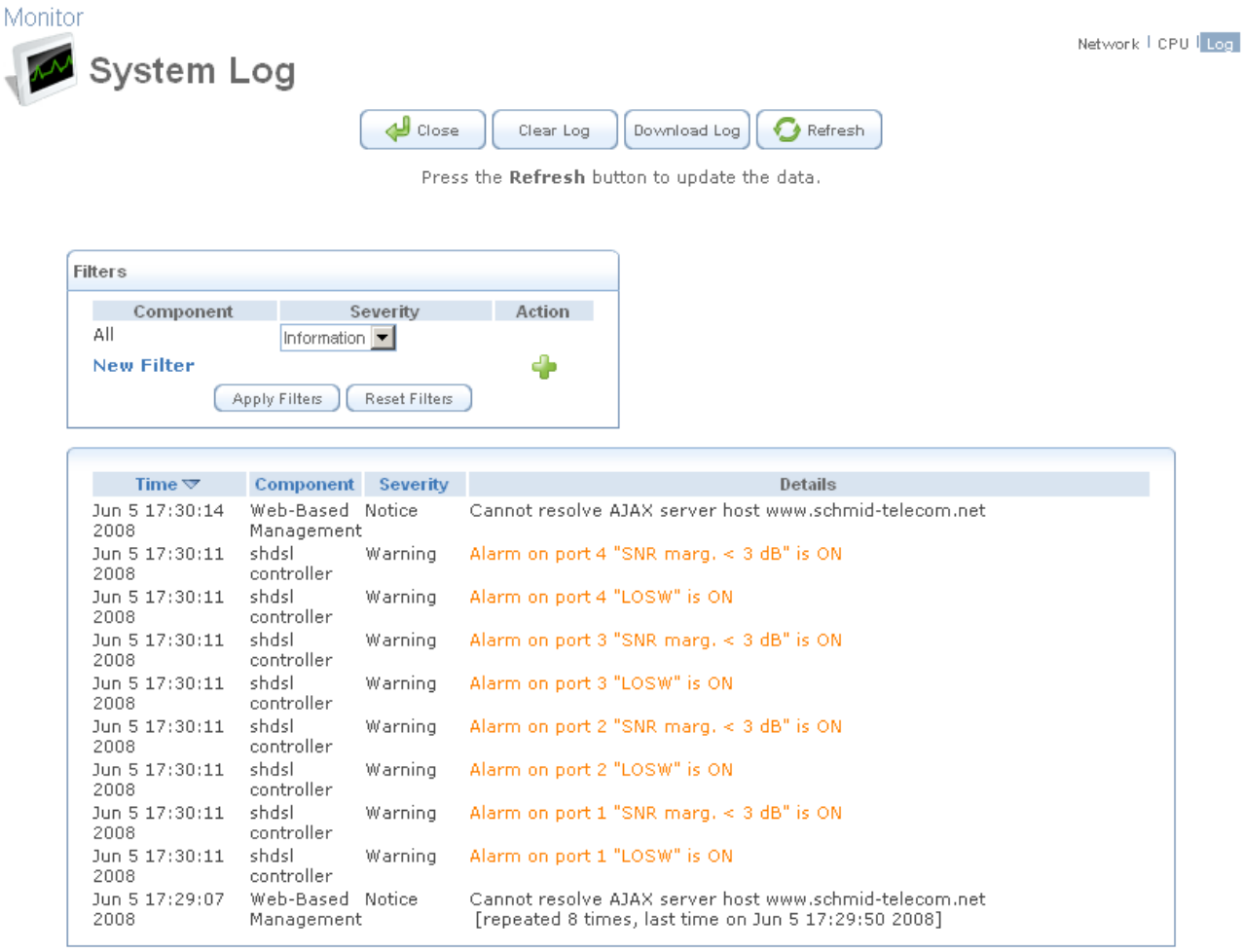

Monitor
System Log
Network | CPU | Log
Close
Clear Log
Download Log
Refresh
Press the Refresh button to update the data.
Filters
Component
Severity
Action
All
Information
New Filter
Apply Filters
Reset Filters
Time
Component
Severity
Details
Jun 5 17:30:14 2008 Web-Based Management Notice Cannot resolve AJAX server host www.schmid-telecom.net
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 4 "SNR marg. < 3 dB" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 4 "LOSW" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 3 "SNR marg. < 3 dB" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 3 "LOSW" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 2 "SNR marg. < 3 dB" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 2 "LOSW" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 1 "SNR marg. < 3 dB" is ON
Jun 5 17:30:11 2008 shdsl controller Warning Alarm on port 1 "LOSW" is ON
Jun 5 17:29:07 2008 Web-Based Management Notice Cannot resolve AJAX server host www.schmid-telecom.net [repeated 8 times, last time on Jun 5 17:29:50 2008]

Figure 9-151: System Log

Use the buttons at the top of the page to:

Close Close the 'Log' screen and return to Watson's home page.

Clear Log Clear all currently displayed log messages.

Download Log Download the log as a Comma Separated Value (CSV) file, named Watson_log.csv.

Refresh Refresh the screen to display the latest updated log messages.

By default, all log messages are displayed one after another, sorted by their order of posting by the system (newest on top). You can sort the messages according to the column titles–-Time, Component, or Severity. This screen also enables you to filter the log messages by the component that generated them, or by their severity, providing a more refined list. This ability is useful mainly for software developers debugging Watson. By default, the screen displays log messages with 'debug' severity level and higher, for all components. You may change the severity level for

this filter. To add a new filter, click the 'New Filter' link or its corresponding action icon . The screen refreshes.

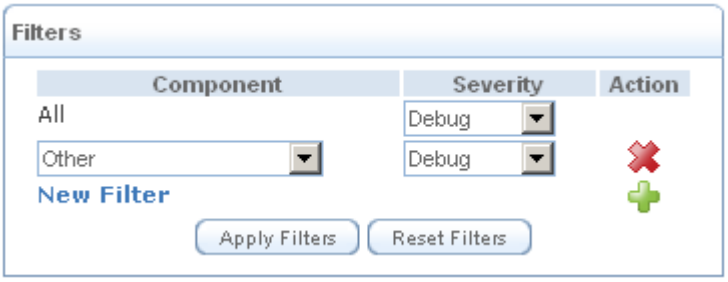


Figure 9-152: System Log Filters

Using the drop-down lists, select the component and severity level by which to sort the log messages. Click 'Apply Filters' to display the messages in your specified criteria. You can add more filters in the same way, or delete filters using their respective action icons. Defined filters override the default filter that displays all messages.

Note: Clicking "Reset Filters" deletes all the defined filters without a warning.

9.6 Routing

9.6.1 Overview

Access Watson's routing settings by clicking the 'Routing' tab under the 'System' screen, or by clicking the 'Routing' icon in the 'Advanced' screen. The 'Routing' screen appears.

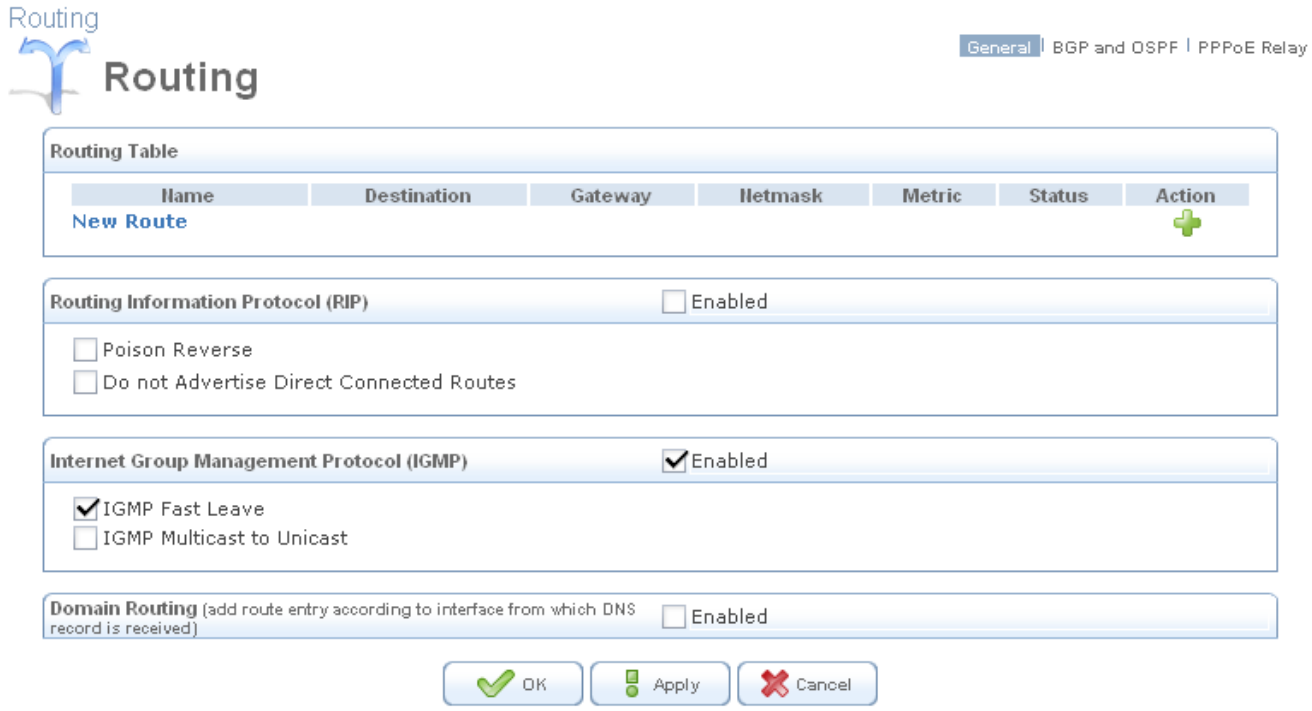


Figure 9-153: Routing

9.6.1.1 Routing Table

You can add, edit and delete routing rules from the routing table in the manner described in Section 4.3. Click the 'New Route' link. The 'Route Settings' screen appears:

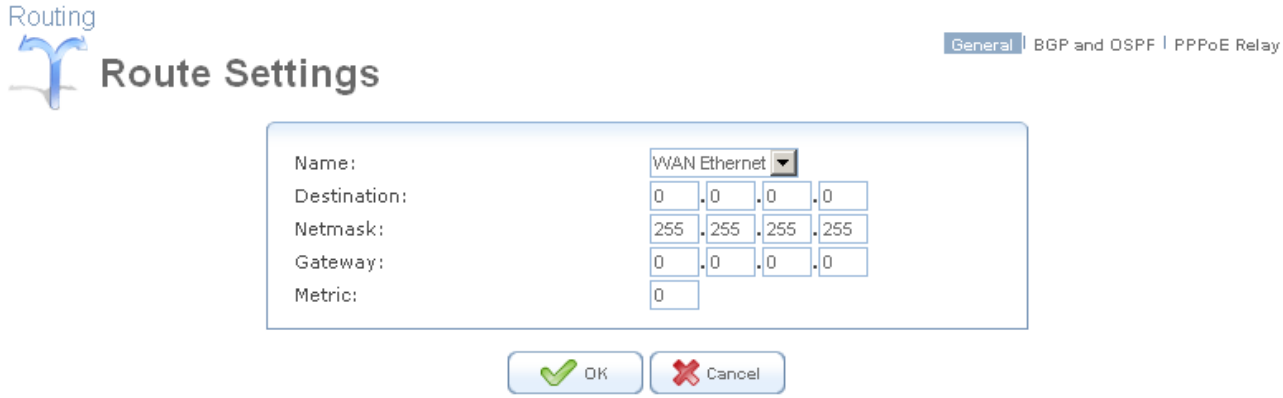


Figure 9-154: Route Settings

When adding a routing rule, you need to specify the following:

Name Select the network device.

Destination The destination is the destination host, subnet address, network address, or default route. The destination for a default route is 0.0.0.0.

Netmask The network mask is used in conjunction with the destination to determine when a route is used.

Gateway Enter the gateway's IP address.

Metric A measurement of the preference of a route. Typically, the lowest metric is the most preferred route. If multiple routes have the same metric value, the default route will be the first in order of appearance.

9.6.1.2 Routing Protocols

Routing Information Protocol (RIP) Select this check-box in order to enable connections previously defined to use RIP. If this check-box is not selected, RIP will be disabled for all connections, including those defined to use RIP.

Poison Reverse Watson will advertise acquired route information with a high metric, in order for other routers to disregard it.

Do not Advertise Direct Connected Routes Watson will not advertise the route information to the same subnet device from which it was obtained.

Internet Group Management Protocol (IGMP) Watson provides support for IGMP multicasting. When a host sends out a request to join a multicast group, Watson will listen and intercept the group's traffic, forwarding it to the subscribed host. Watson keeps record of subscribed hosts. When a host requests to cancel its subscription, Watson queries for other subscribers and stops forwarding the multicast group's traffic after a short timeout.

Enable IGMP Fast Leave If a host is the only subscriber, Watson will stop forwarding traffic to it immediately upon request (there will be no query delay).

IGMP Multicast to Unicast Enables Watson to convert the incoming multicast data stream into unicast format, in order to route it to the specific LAN host that had requested the data. In this way, Watson will prevent flooding the rest of the LAN hosts with irrelevant multicast traffic.

Domain Routing When Watson's DNS server receives a reply from an external DNS server, it will add a routing entry for the IP address of the reply through the device from which it arrived. This means that future packets from this IP address will be routed through the device from which the reply arrived.

9.6.2 BGP and OSPF

The 'BGP and OSPF' feature is an implementation of two routing protocols used to deliver up-to-date routing information to a network or a group of networks, called Autonomous System.

Border Gateway Protocol (BGP) The main routing protocol of the Internet. It is used to distribute routing information among Autonomous Systems (for more information, refer to the protocol's RFC at http://www.ietf.org/rfc/rfc1771.txt).

Open Shortest Path First Protocol (OSPF) An Interior Gateway Protocol (IGP) used to distribute routing information within a single Autonomous System (for more information, refer to the protocol's RFC at http://www.ietf.org/rfc/rfc2328.txt).

The feature's routing engine is based on the Quagga GNU routing software package. By using the BGP and OSPF protocols, this routing engine enables Watson to exchange routing information with other routers within and outside an Autonomous System. To enable this feature, perform the following:

1. In the 'Routing' screen, click the 'BGP and OSPF' link. The 'BGP and OSPF' screen appears.

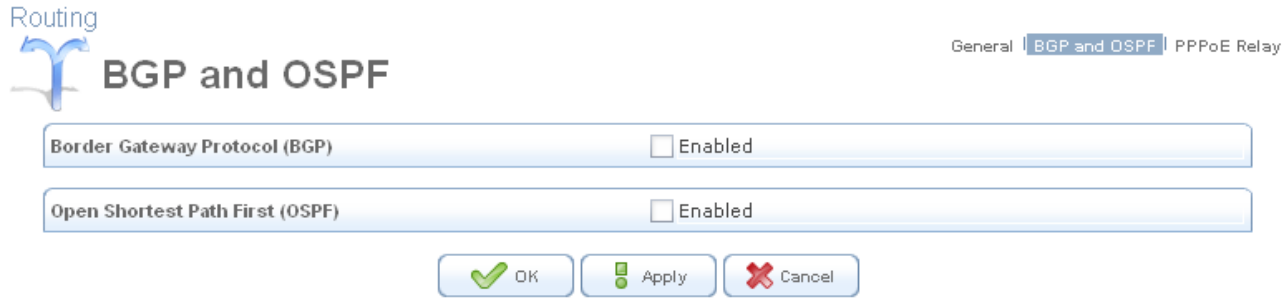


Figure 9-155: BGP and OSPF

Note: Depending on its purpose of use, Watson may support both of the protocols or only one of them.

2. Select the 'Enabled' check box of the supported protocol(s). For example, enable OSPF. The screen refreshes, changing to the following.

Figure 9-156: Enabled OSPF

To activate the routing engine, you need to create a configuration file for the protocol daemon, and also for Zebra. Zebra is Quagga's IP routing management daemon, which provides kernel routing table updates, interface lookups, and redistribution of routes between the routing protocols.

Note: To view examples of the configuration files, browse to http://www.quagga.net/docs/quagga.pdf .

3. Enter the configuration files into their respective code fields. Alternatively, click the 'Set Default Values' button to the right of each code field. The default values, displayed in a field are the following:

   - BGP :

     !router bgp <AS number> The exclamation mark is Quagga's comment character. The router bgp string is a command that activates the BGP daemon. The exclamation mark emphasizes that the command must be followed by an exact Autonomous System's ID number.

     log syslog A command that instructs the daemon to send its log messages to the system log.

   - OSPF :

     router ospf A command that activates the OSPF daemon.

     log syslog See the explanation under BGP.

   - Zebra

     interface ixp1 Instructs the daemon to query and update routing information via a specific WAN device. It is important that you change the default ixp1 value to your WAN device name.

     log syslog See the explanation under BGP.

4. Click 'OK' to save the settings.

If the OSPF daemon is activated, Watson starts sending the 'Hello' packets to other routers to create adjacencies. After determining the shortest path to each of the neighboring routers, Zebra updates the routing table according to the network changes. If the BGP deamon is activated, Watson starts to advertise routes it uses to other BGP-enabled network devices located in the neighboring Autonomous System(s). The BGP protocol uses TCP as its transport protocol. Therefore, Watson first establishes a TCP connection to routers with which it will communicate. KeepAlive messages are sent periodically to ensure the liveness of the connection. When a change in the routing table occurs, Watson advertises an Update message to its peers. This update message adds a new route or removes the unfeasible one from their routing table.

9.6.3 PPPoE Relay

PPPoE Relay enables Watson to relay packets on PPPoE connections, while keeping its designated functionality for any additional connections. The PPPoE Relay screen displays a check-box that enables PPPoE Relay.

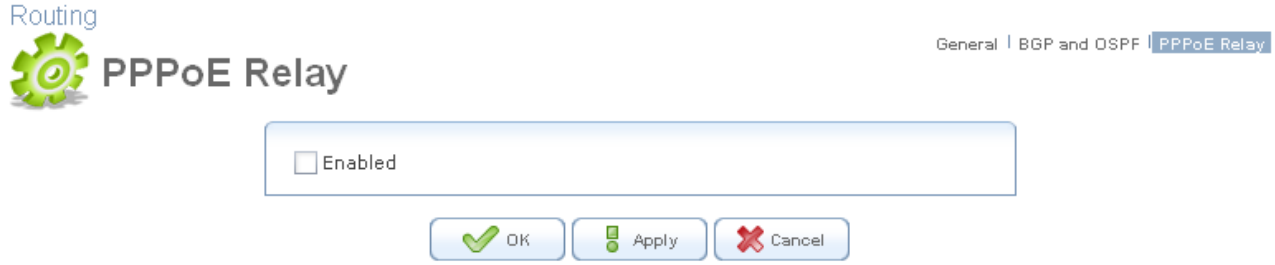


Figure 9-157: PPPoE Relay

9.7 Management

9.7.1 Universal Plug and Play

Universal Plug-and-Play is a networking architecture that provides compatibility among networking equipment, software and peripherals. Watson can seamlessly connect and communicate with other Universal Plug-and-Play enabled devices, without the need for user configuration, centralized servers, or product-specific device drivers. This technology leverages existing standards and technologies, including TCP/IP, HTTP 1.1 and XML, facilitating the incorporation of Universal Plug-and-Play capabilities into a wide range of networked products. Any UPnP-enabled control point (client) can dynamically join the network, obtain an IP address and exchange information about its capabilities and those of other computers on the network. They can subsequently communicate with each other directly, thereby further enabling peer-to-peer networking. And this all happens automatically, providing a truly zero-configuration network.

9.7.1.1 UPnP on Watson

If your computer is running an operating system that supports UPnP, such as Windows XP, you can add the computer to your home network and access the Web-based Management directly from within Windows.

- To add a UPnP-enabled computer to the home network:

  1. Connect the PC to the gateway.

  2. The PC will automatically be recognized and added to the home network. Watson will be added to 'My Network Places' as the Internet Gateway Device and will allow configuration via a standard Windows interface.

  3. A message appears on the notification area of the Taskbar notifying that the PC has been added to the network.

- To access the WBM directly from Windows:

  1. Open the 'My Network Places' window by double-clicking its desktop icon.

2. Double-click the 'Internet Gateway Device' icon. The WBM login screen appears in a browser window. This method is similar to opening a browser window and typing in '192.168.1.1'.

- To monitor the status of the connection between Watson and the Internet:

  1. Open the 'Network Connections' control panel.

  2. Double-click 'Internet Connection' icon.

You may also make services provided by computers in the home network available to computers on the Internet. For example, you may designate a PC in your home network to act as a Web server, allowing computers on the Internet to request pages from it. Or a game that you want to play over the Internet may require that specific ports be opened to allow communication between your PC and other players. Please refer to Section 8.2.3 for more information.

- To make local services available to computers on the Internet:

  4. Open the 'Network Connections' control panel.

  5. Right-click 'Internet Connection' and choose 'Properties'. The 'Internet Connection Properties' window appears.

  6. Press the 'Settings' button. The 'Advanced Settings' window will appear

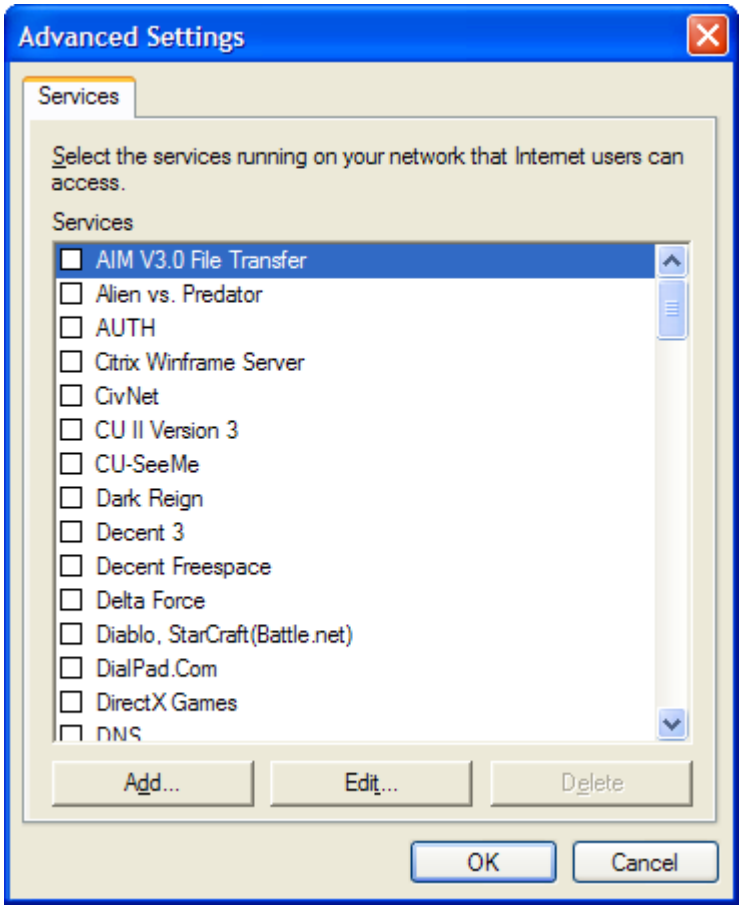


Figure 9-158: Advanced Settings

7. Select a local service that you would like to make available to computers on the Internet. The 'Service Settings' window will automatically appear.

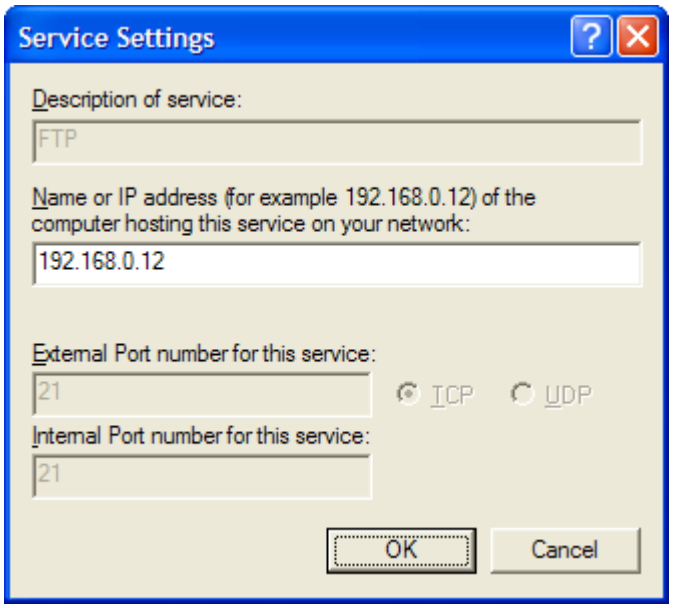


Figure 9-159: Service Settings: Edit Service

8. Enter the local IP address of the computer that provides this service and click 'OK'.
9. Select other services as desired and repeat the previous step for each.
10. Click 'OK' to save the settings.

- To add a local service that is not listed in the 'Advanced Settings' window:

11. Follow steps 1-3 above.
12. Press the 'Add...' button. The 'Service Settings' window will appear.

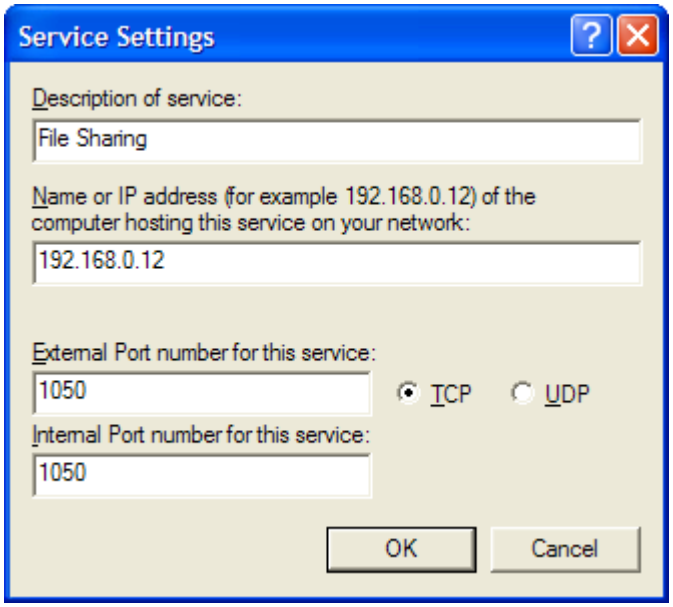


Figure 9-160: Service Settings: Add Service

13. Complete the fields as indicated in the window.
14. Click 'OK' to close the window and return to the 'Advanced Settings' window. The service will be selected.
15. Click 'OK' to save the settings.

9.7.1.2 UPnP Configuration

The UPnP feature is enabled by default. Access its settings either from the 'Management' tab under the 'System' screen, or by clicking the 'Universal Plug and Play' icon in the 'Advanced' screen. The 'Universal Plug and Play' settings screen appears:

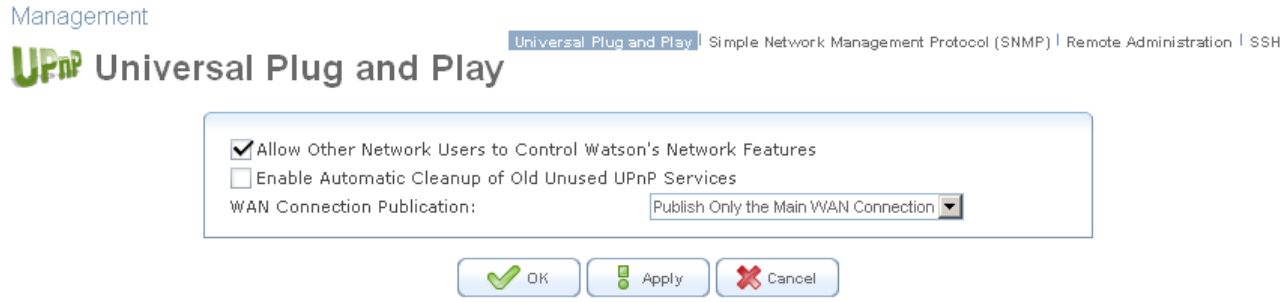

Management
Universal Plug and Play
Universal Plug and Play | Simple Network Management Protocol (SNMP) | Remote Administration | SSH
Allow Other Network Users to Control Watson's Network Features
Enable Automatic Cleanup of Old Unused UPnP Services
WAN Connection Publication:
Publish Only the Main WAN Connection
OK
Apply
Cancel

Figure 9-161: Universal Plug and Play

Allow Other Network Users to Control Watson's Network Features Select this check-box to enable the UPnP feature. This will enable you to define UPnP services on any of the LAN hosts.

Enable Automatic Cleanup of Old Unused UPnP Services Select this check-box to enable automatic cleanup of invalid rules. This feature checks the validity of all UPnP services every 5 minutes, and removes old and obsolete services, unless a user-defined rule depends on them (see Section 8.2).

WAN Connection Publication By default, Watson will publish only its main WAN connection, which will be controllable by UPnP entities. However, you may select the 'Publish All WAN Connections' option if you wish to grant UPnP control over all of Watson's WAN connections.

9.7.2 Simple Network Management Protocol

Simple Network Management Protocol (SNMP) enables network management systems to remotely configure and monitor Watson. Your Internet Service Provider (ISP) may use SNMP in order to identify and resolve technical problems. Technical information regarding the properties of Watson's SNMP agent should be provided by your ISP. To configure Watson's SNMP agent, perform the following:

1. Access this feature either from the 'Management' menu item under the 'System' tab, or by clicking its icon in the 'Advanced' screen. The 'SNMP' screen appears:

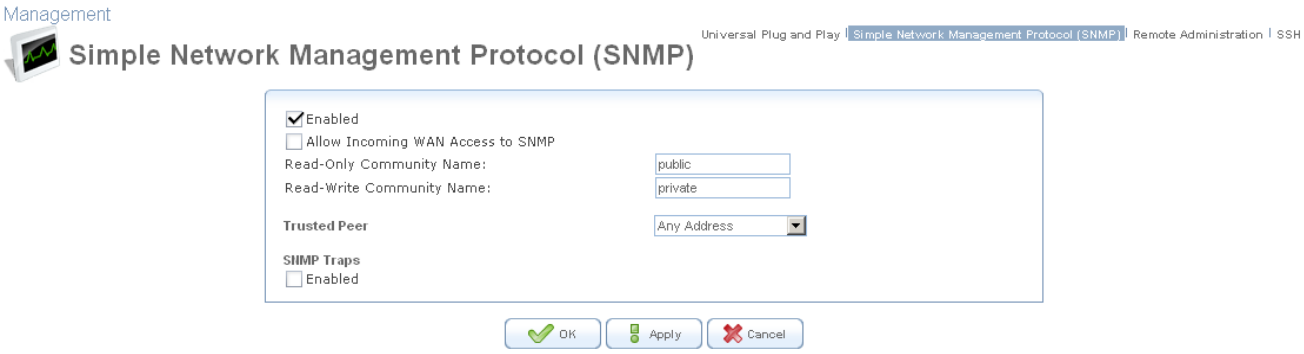


Figure 9-162: SNMP Management

2. Specify the SNMP parameters, as provided by your Internet service provider:

Allow Incoming WAN Access to SNMP Select this check box to allow access to Watson's SNMP over the Internet.

Read-only/Write Community Names SNMP community strings are passwords used in SNMP messages between the management system and Watson. A read-only community allows the manager to monitor Watson. A read-write community allows the manager to both monitor and configure Watson.

Trusted Peer The IP address, or subnet of addresses, that identify which remote management stations are allowed to perform SNMP operations on Watson.

SNMP Traps Messages sent by Watson to a remote management station, in order to notify the manager about the occurrence of important events or serious conditions. Watson supports both SNMP version 1 and SNMP version 2c traps. Check the Enabled check box to enable this feature. The screen refreshes, displaying the following fields.

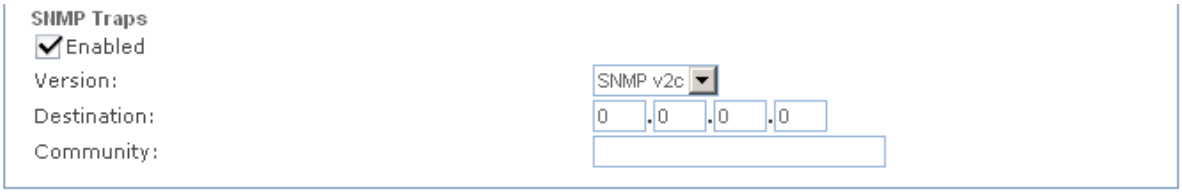


Figure 9-163: SNMP Traps

Version Select between version SNMP v1 and SNMP v2c.

Destination The remote management station's IP address.

Community Enter the community name that will be associated with the trap messages.

9.7.2.1 Defining an SNMPv3 User Account

Simple Network Management Protocol version 3 (SNMPv3) enables you to perform certain management and monitoring operations on Watson outside its WBM. In-

formation is exchanged between a management station and Watson's SNMP agent in the form of an SNMP message. The advantage of the third version of SNMP over the previous versions is that it provides user authentication, privacy, and access control.

SNMPv3 specifies a User Security Model (USM) that defines the need to create an SNMP user account, in order to secure the information exchange between the management station and the SNMP agent. The following example demonstrates how to define an SNMPv3 user account in Watson. Let's assume that you want to add a new SNMPv3 user called "admin". For this purpose, perform the following steps:

1. Add the SNMPv3 user account to the USM table.
2. Associate the user with a new or an existing group.
3. Associate the group with specific views.
4. Create the group views.

Step 1 is performed from Watson's CLI. Steps 2–4 are performed from a Linux shell, as in the following example.

1. Add the new user (admin) to the USM table, by running the following conf set commands from Watson's CLI:

```
Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/name admin

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/security_name admin

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/public ""

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/auth_protocol 1.3.6.1.6.3.10.1.1.1

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/priv_protocol 1.3.6.1.6.3.10.1.2.1

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/storage_type 3

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/row_status 1
```

```
Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/clone_from 0.0

Watson> conf set
/snmp/mibs/usm_mib/usmuser_table/13.128.0.42.47.128.242.184.29.85
.234.15
.79.65.5.97.100.109.105.110/engine_id <ENGINE_ID>
```

The sub-OID 13.128.0.42.47.128.242.184.29.85.234.15.79.65 stands for the engine ID (with length of 13 octets). The decimal values of each engine ID are permanent. The sub-OID 5.97.100.109.105.110 stands for "admin" (5 octets, according to the word length). The decimal values of the user name appear as defined in the ASCII table. The <ENGINE_ID> parameter should be taken from the engine ID in the output of the following command:

```
Watson> conf print /snmp/persist_conf
```

Note: You should copy the engine ID without the "0x" prefix.

After the commands specified above are issued, the authentication protocol is set to usmNoAuthProtocol (which has OID 1.3.6.1.6.3.10.1.1.1), and the privacy protocol is set to usmNoPrivProtocol (which has OID 1.3.6.1.6.3.10.1.2.1).

2. Associate the user with a group. The associated group can be either a new group or an existing group. For example, to add a new group called "admin_group" and associate it with the user "admin", run the following SNMP SET commands from a Linux shell:

```
$ snmpset -v2c -c private <Watson's IP address> vacmSecuri-
tyToGroupStatus.3.5.97.100.109.105
.110 i createAndWait

$ snmpset -v2c -c private <Watson's IP address> vacmGroup-
Name.3.5.97.100.109.105.110 s
admin_group

$ snmpset -v2c -c private <Watson's IP address> vacmSecuri-
tyToGroupStorageType.3.5.97.100
.109.105.110 i nonVolatile

$ snmpset -v2c -c private <Watson's IP address> vacmSecuri-
tyToGroupStatus.3.5.97.100.109.105
.110 i active
```

The sub-OID 5.97.100.109.105.110 stands for "admin" (with length of 5 octets). These commands populate vacmSecurityToGroupTable with a new group called "admin_group".

3. Associate between the group and its views. For example, suppose you want to associate "admin_group" with a view called "admin_view" for reading, writing and notifications, with security level of noAuthNoPriv. You can do this by running the following SNMP SET commands from a Linux shell:

```
$ snmpset -v2c -c private <Watson's IP address> vacmAccessSta-
tus.11.97.100.109.105.110.95
.103.114.111.117.112.0.3.1 i createAndWait
```

```
$ snmpset -v2c -c private <Watson's IP address> vacmAccessCon-
textMatch.11.97.100.109.105.110
.95.103.114.111.117.112.0.3.1 i exact

$ snmpset -v2c -c private <Watson's IP address> vacmAccessRead-
ViewName.11.97.100.109.105.110
.95.103.114.111.117.112.0.3.1 s admin_view

$ snmpset -v2c -c private <Watson's IP address> vacmAccess-
WriteViewName.11.97.100.109.105
.110.95.103.114.111.117.112.0.3.1 s admin_view

$ snmpset -v2c -c private <Watson's IP address> vacmAccessNoti-
fyViewName.11.97.100.109.105
.110.95.103.114.111.117.112.0.3.1 s admin_view

$ snmpset -v2c -c private <Watson's IP address> vacmAc-
cessStorageType.11.97.100.109.105.110
.95.103.114.111.117.112.0.3.1 i nonVolatile

$ snmpset -v2c -c private <Watson's IP address> vacmAccessSta-
tus.11.97.100.109.105.110.95
.103.114.111.117.112.0.3.1 i active
```

The sub-OID 11.97.100.109.105.110.95.103.114.111.117.112 stands for "admin_group" (with length of 11 octets).

4. Create the needed views. For example, suppose you want to define "admin_view" as a view that includes all the 1.3 subtree. You can do this by running the following SNMP SET commands:

```
$ snmpset -v2c -c private <Watson's IP address> vacmViewTreeFam-
ilyStatus.10.97.100.109.105
.110.95.118.105.101.119.2.1.3 i createAndWait

$ snmpset -v2c -c private <Watson's IP address> vacmViewTreeFam-
ilyType.10.97.100.109.105.110
.95.118.105.101.119.2.1.3 i included

$ snmpset -v2c -c private <Watson's IP address> vacmViewTreeFam-
ilyStorageType.10.97.100.109
.105.110.95.118.105.101.119.2.1.3 i nonVolatile

$ snmpset -v2c -c private <Watson's IP address> vacmViewTreeFam-
ilyStatus.10.97.100.109.105
.110.95.118.105.101.119.2.1.3 i active
```

The sub-OID 10.97.100.109.105.110.95.118.105.101.119 stands for "admin_view".

After completing these steps, you will have an SNMPv3 user account defined in Watson. The following is a sample SNMPv3 query issued to Watson's SNMP agent:

```
$ snmpwalk -v 3 -u admin -l noAuthNoPriv 192.168.1.1
```

9.7.3 Remote Administration

It is possible to access and control Watson not only from within the home network, but also from the Internet. This allows you to view or change settings while travelling. It also enables you to allow your ISP to change settings or help you troubleshoot functionality or communication issues from a remote location.

Remote access to Watson is blocked by default to ensure the security of your home network. However, remote access is supported by the following services, and you may use the 'Remote Administration' screen to selectively enable these services if they are needed. To view Watson's remote administration options, click the 'Management' menu item under the 'System' tab, or the 'Remote Administration' icon in the 'Advanced' screen. The 'Remote Administration' screen appears.

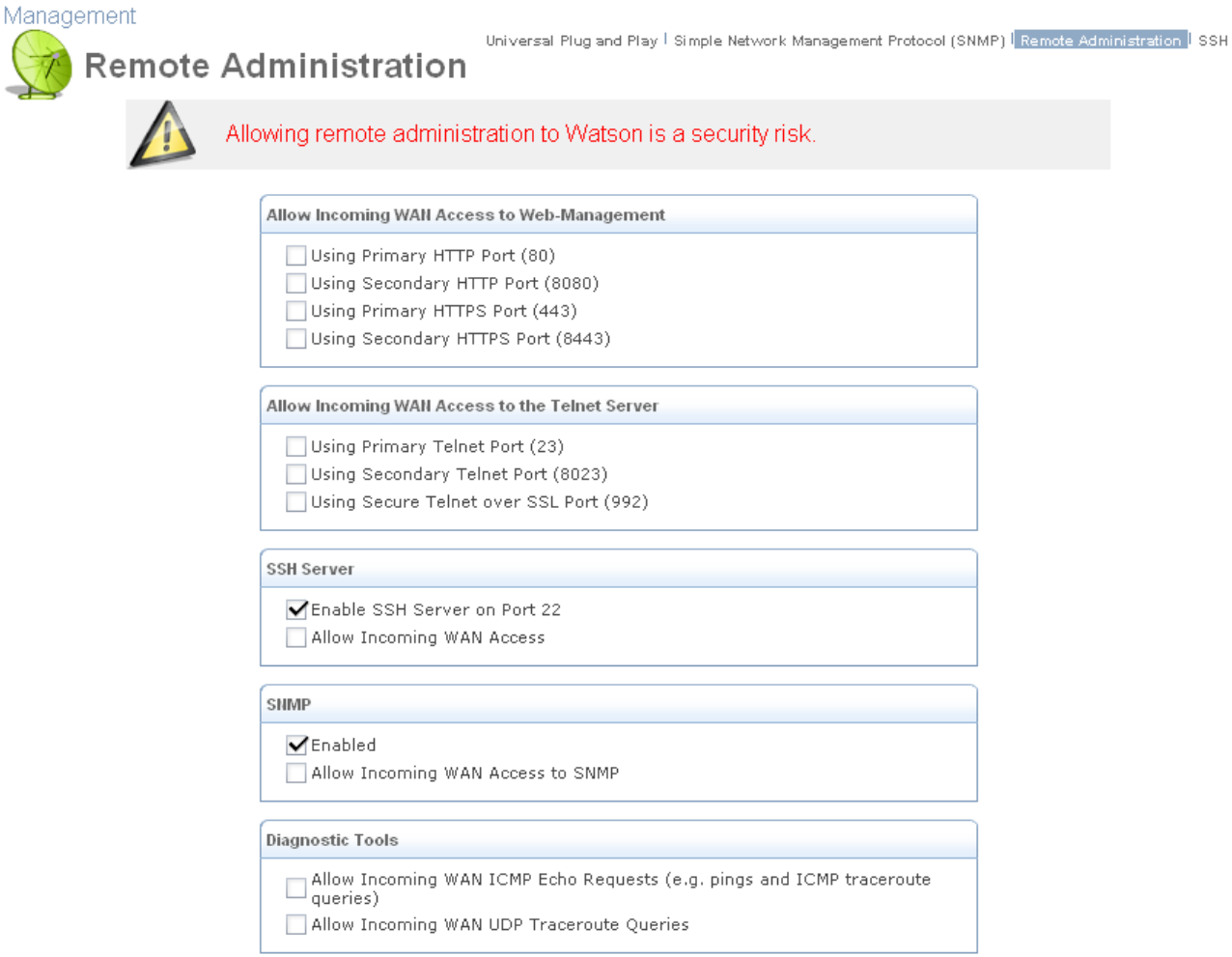

Management
Remote Administration
Universal Plug and Play | Simple Network Management Protocol (SNMP) | Remote Administration | SSH
Allowing remote administration to Watson is a security risk.
Allow Incoming WAN Access to Web-Management
Using Primary HTTP Port (80)
Using Secondary HTTP Port (8080)
Using Primary HTTPS Port (443)
Using Secondary HTTPS Port (8443)
Allow Incoming WAN Access to the Telnet Server
Using Primary Telnet Port (23)
Using Secondary Telnet Port (8023)
Using Secure Telnet over SSL Port (992)
SSH Server
Enable SSH Server on Port 22
Allow Incoming WAN Access
SNMP
Enabled
Allow Incoming WAN Access to SNMP
Diagnostic Tools
Allow Incoming WAN ICMP Echo Requests (e.g. pings and ICMP traceroute queries)
Allow Incoming WAN UDP Traceroute Queries

Figure 9-164: Remote Administration

Allow Incoming Access to Web-Management Used to obtain access to the WBM and to all system settings and parameters using a browser. Both secure (HTTPS) and non-secure (HTTP) access is available.

Allow Incoming Access to the Telnet Server Used to create a command-line session and gain access to all system settings and parameters (using a text-based terminal).

SSH Server Similar to Telnet, this protocol is used to create a secured command-line session and gain access to all system settings and parameters.

Note: Web Management, Telnet and SSH may be used to modify settings of the firewall or disable it. The user may also change local IP addresses and other settings, making it difficult or impossible to access the gateway from the home network. Therefore, remote access to Telnet or HTTP services should be blocked and should only be permitted when it is absolutely necessary.

SNMP Used to allow Simple Network Management Protocol (SNMP) requests to remotely configure and monitor Watson. For more information, refer to Section 9.7.2.

Diagnostic Tools Used for troubleshooting and remote system management by you or your Internet Service Provider. The utilities that can be used are Ping and Traceroute (over UDP).

To allow remote access to Watson's administrative services:

1. Select the services that you would like to make available to computers on the Internet. The following should be taken into consideration:

   - Although Telnet service is password-protected, it is not considered a secured protocol. When allowing incoming access to a Telnet server, if port forwarding is configured to use port 23, select port 8023 to avoid conflicts.
   - When allowing incoming access to the WBM, if port forwarding is configured to use port 80, select port 8080 to avoid conflicts.

2. Click 'OK' to save the settings.

Encrypted remote administration is performed using a secure SSL connection, which requires an SSL certificate. When accessing Watson for the first time using encrypted remote administration, you will encounter a warning message generated by your browser regarding certificate authentication. This is due to the fact that Watson's SSL certificate is self-generated. When encountering this message under these circumstances, ignore it and continue. It should be noted that even though this message appears, the self-generated certificate is safe, and provides you with a secure SSL connection. It is also possible to assign a user-defined certificate to Watson. To learn about certificates, refer to Section 9.9.4.

9.7.4 Secure Shell

Secure Shell (SSH) is a protocol that provides encrypted connections to remote hosts or servers. Watson supports SSH connection requests from LAN clients with administrative permissions. When connected, a secured command-line session will grant a user access to all system settings and parameters. This service can also be opened to WAN clients. To learn more, please refer to Section 9.7.3. Access this feature either from its link in the 'Management' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'SSH' screen appears:

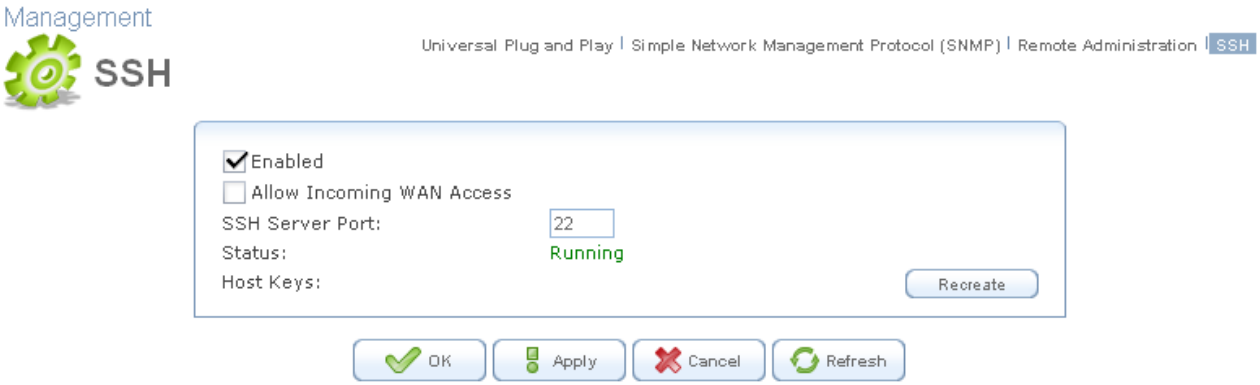


Figure 9-165: Secure Shell

Enabled Check or un-check this box to enable or disable this feature.

Allow Incoming WAN Access Check this box to open the SSH service to WAN clients.

SSH Server Port Specify the port that will be used for SSH traffic.

Status This feature is enabled by default, and its status appears as "Running". This status will change reflecting actions performed.

Host Keys Host keys are used to identify Watson to incoming SSH connection requests. You may wish to use new keys instead of the old ones. To do so, press the 'Recreate' button. The status will change to "Generating Host Keys" until the keys are created and saved in Watson's configuration file.

9.8 Maintenance

9.8.1 About Watson

The 'About Watson' screen presents various details about Watson's software version, such as version number, type of platform and list of features. In addition, it displays Schmid Telecom's contact information.

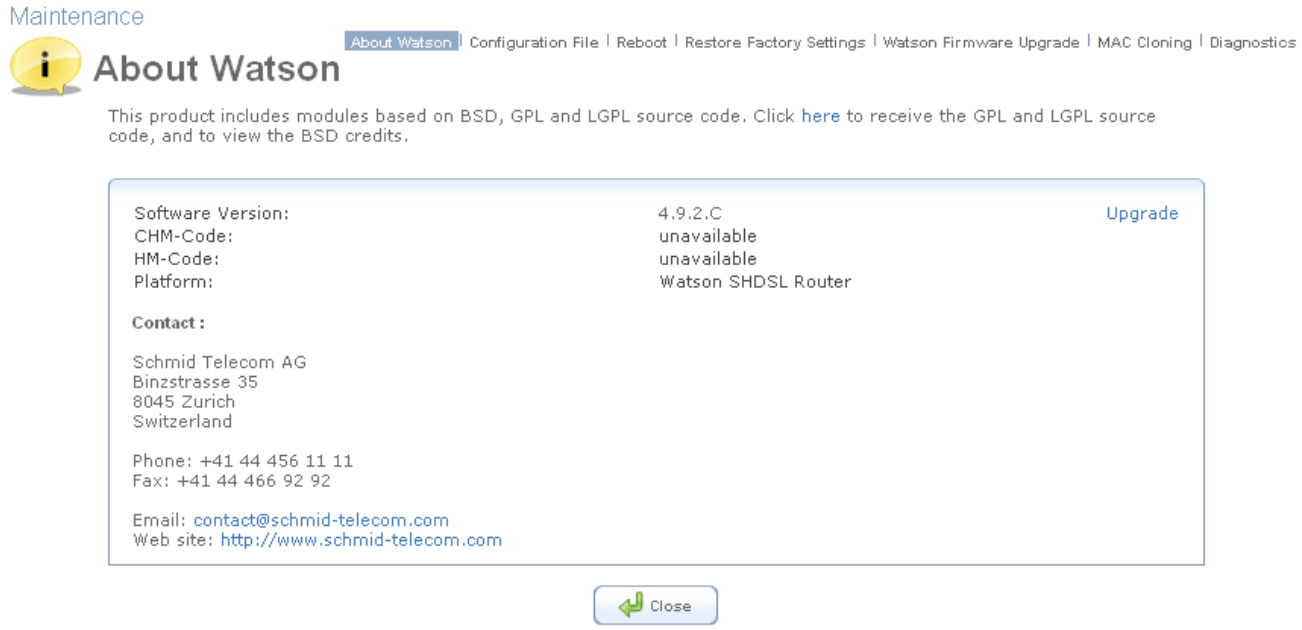

Maintenance
About Watson
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
This product includes modules based on BSD, GPL and LGPL source code. Click here to receive the GPL and LGPL source code, and to view the BSD credits.
Software Version: 4.9.2.C Upgrade
CHM-Code: unavailable
HM-Code: unavailable
Platform: Watson SHDSL Router
Contact :
Schmid Telecom AG
Binzstrasse 35
8045 Zurich
Switzerland
Phone: +41 44 456 11 11
Fax: +41 44 466 92 92
Email: contact@schmid-telecom.com
Web site: http://www.schmid-telecom.com
Close

Figure 9-166: About Watson

The line at the top of the screen relates to Watson's GNU General Public License (GPL) compatibility, and provides a link to the licensing acknowledgement and source code offering page in Jungo's web site. For more information, refer to Section 11.3.

9.8.2 Configuration File

Watson enables you to view, save and load its configuration file in order to backup and restore your current configuration.

1. Access this feature either from the 'Maintenance' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Configuration File' screen appears, displaying the complete contents of Watson's configuration file.

Figure 9-167: Configuration File

2. Press the 'Load Configuration File' button to restore your configuration from a file and restart Watson.
3. Press the 'Save Configuration File' button to backup your current configuration to a file.

Note: Upon reboot, Watson restores the settings from its configuration file. However, if reboot attempts fail three times consecutively, Watson will reset the configuration file by restoring factory defaults before attempting to reboot.

9.8.3 Reboot

To reboot Watson:

1. Access this feature either from the 'Maintenance' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Reboot' screen appears:

Maintenance
Reboot
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
Are you sure you want to reboot Watson ?
OK
Cancel

Figure 9-168: Reboot

2. Press 'OK' to reboot Watson. This may take up to one minute.

To re-enter the WBM after restarting the gateway, press the browser's 'Refresh' button.

9.8.4 Restore Factory MAC Address

Watson enables you to restore the MAC address of the WAN and LAN interfaces to the initial factory assigned address.

Changing MAC addresses may interrupt the management connection. You may have to wait a short time and manually refresh the page.

9.8.5 Restore Defaults

Restoring Watson's factory default settings removes all of the configuration changes made to Watson. This is useful, for example, when you wish to build a new network from the beginning, or when you cannot recall changes made to the network and wish to go back to the default configuration. To restore default settings:

1. Access this feature either from the 'Maintenance' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Restore Defaults' screen appears:

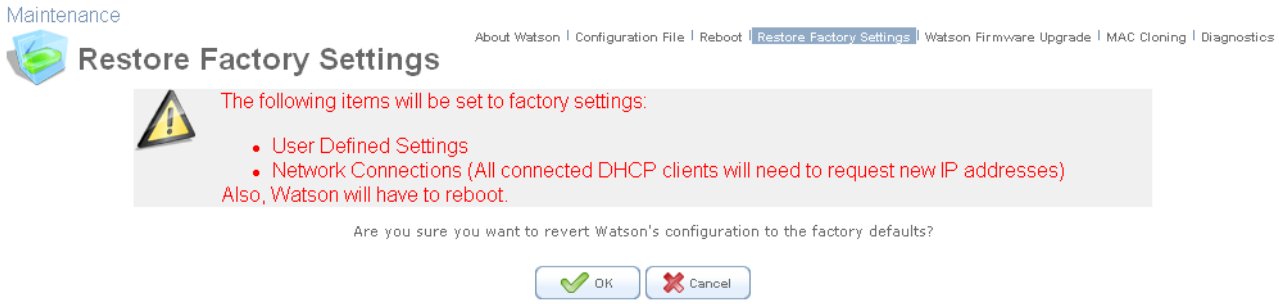

Maintenance
Restore Factory Settings
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
The following items will be set to factory settings:
User Defined Settings
Network Connections (All connected DHCP clients will need to request new IP addresses)
Also, Watson will have to reboot.
Are you sure you want to revert Watson's configuration to the factory defaults?
OK
Cancel

Figure 9-169: Restore Defaults

2. Press 'OK' to restore Watson's factory default settings.

Note: All WBM settings and parameters, not only those in the Advanced section, will be restored to their default values. This includes the administrator password; a user-specified password will no longer be valid.

Note: if you load a configuration file that was created with another Watson SHDSL router, the factory MAC Address will be overwritten. This is probably not wanted, as every network device should have a unique MAC address. After loading the configuration file it might be necessary to restore the factory MAC addresses of the device.

9.8.6 Watson Firmware Upgrade

Watson offers a built-in mechanism for upgrading its software image, without losing any of your custom configurations and settings. There are two methods for upgrading the software image:

- Upgrading from a local computer—use a software image file pre-downloaded to your PC's disk drive or located on the accompanying evaluation CD.
- Upgrading from the Internet—also referred to as Remote Update, use this method to upgrade your firmware by remotely downloading an updated software image file.

Following are instructions for each of these methods.

9.8.6.1 Upgrading From a Local Computer

To upgrade Watson's software image using a locally available .rmt file:

1. Access this feature either from the 'Maintenance' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Watson Firmware Upgrade' screen appears.

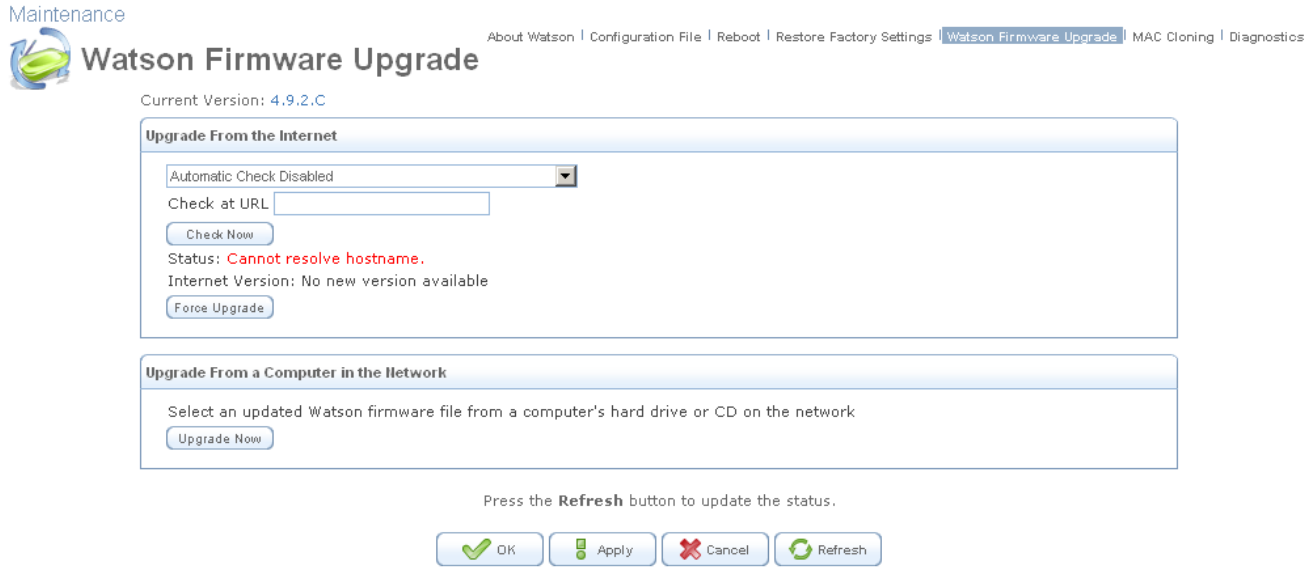

Maintenance
Watson Firmware Upgrade
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
Current Version: 4.9.2.C
Upgrade From the Internet
Automatic Check Disabled
Check at URL
Check Now
Status: Cannot resolve hostname.
Internet Version: No new version available
Force Upgrade
Upgrade From a Computer in the Network
Select an updated Watson firmware file from a computer's hard drive or CD on the network
Upgrade Now
Press the Refresh button to update the status.
OK
Apply
Cancel
Refresh

Figure 9-170: Watson Firmware Upgrade

2. In the 'Upgrade From a Computer in the Network' section, click the 'Upgrade Now' button. The 'Upgrade From a Computer in the Network' screen appears.

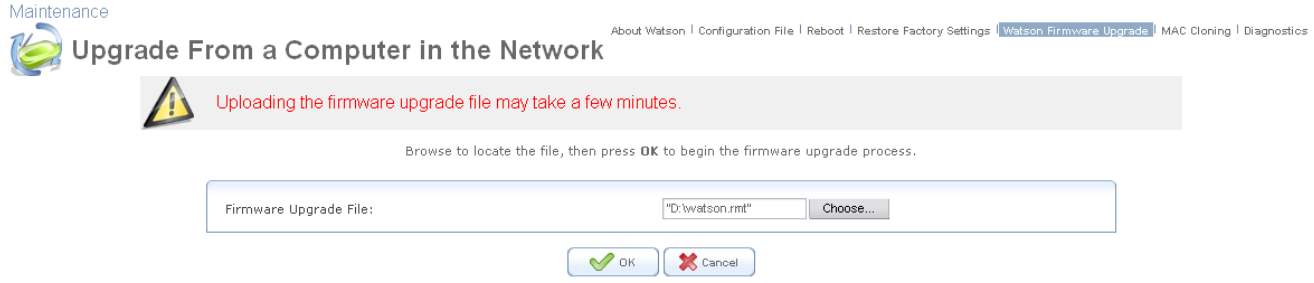

Maintenance
Upgrade From a Computer in the Network
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
Uploading the firmware upgrade file may take a few minutes.
Browse to locate the file, then press OK to begin the firmware upgrade process.
Firmware Upgrade File:
"D:\watson.rmt"
Choose...
OK
Cancel

Figure 9-171: Upgrade From a Computer in the Network

3. Enter the path of the software image file, or click the 'Browse' button to browse for the file on your PC, and click 'OK'.

Note: You can only use files with an ' rmt ' extension when performing the firmware upgrade procedure.

The file will start loading from your PC to the gateway. When loading is completed, the following confirmation screen appears, asking if you would like to upgrade to the new version:

4. Click 'OK' to confirm. When the upgrade process ends, Watson automatically reboots, and the login screen of the updated image is displayed. The new software maintains your custom configurations and settings.

9.8.6.2 Upgrading From the Internet

The Remote Update mechanism helps you keep your software image up-to-date, by performing routine daily checks for newer software versions, as well as letting you perform manual checks. To view the automatic check utility's settings and last check result, click the 'Watson Firmware Upgrade' icon from the 'Advanced' screen. The 'Watson Firmware Upgrade' screen will appear. In the 'Upgrade From the Internet' section, you can select the utility's checking method and interval. The result of the last performed check is displayed by the line between the 'Check Now' and 'Force Upgrade' buttons, indicating whether a new version is available or not.

- If a new version is available:

  1. Press the 'Force Upgrade' button. A download process will begin. When downloading is completed, a confirmation screen will appear, asking you if you want to upgrade to the new version.

  2. Click 'OK' to confirm. The upgrade process will begin and should take no longer than one minute to complete.

  3. At the conclusion of the upgrade process Watson will automatically reboot. The new software version will run, maintaining your custom configurations and settings.

- If a new version is not available:

  1. Press the 'Check Now' button to perform an immediate check (instead of waiting for the next scheduled one). The screen will display a green "Check in progress..." message.

  2. Press the 'Refresh' button until the check is completed and the result is displayed.

9.8.7 MAC Cloning

A Media Access Control (MAC) address is the numeric code that identifies a device on a network, such as your external cable/DSL modem or a PC network card. Your service provider may ask you to supply the MAC address of your PC, external modem, or both. When replacing an external modem with Watson, you can simplify the installation process by copying the MAC address of your existing PC to Watson. In such a case, you do not need to delay the setup process by informing your service provider of newly installed equipment. To use MAC cloning:

1. Access this feature either from the 'Maintenance' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'MAC Cloning' screen appears:

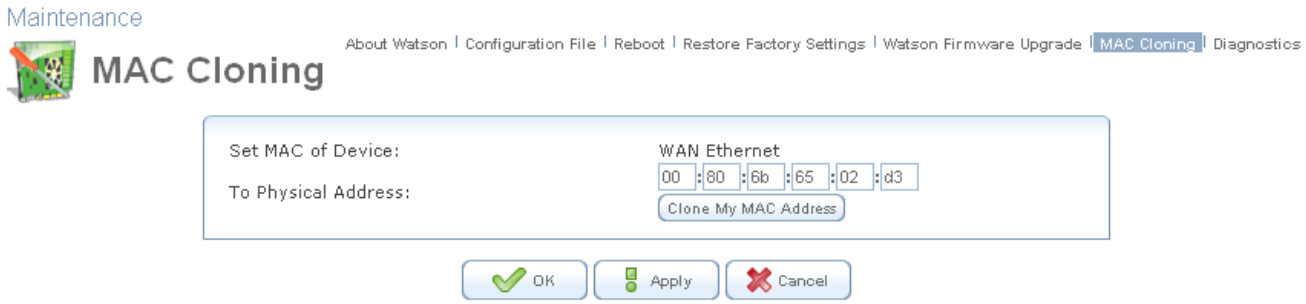

Maintenance
MAC Cloning
About Watson | Configuration File | Reboot | Restore Factory Settings | Watson Firmware Upgrade | MAC Cloning | Diagnostics
Set MAC of Device:
WAN Ethernet
To Physical Address:
00 :80 :6b :65 :02 :d3
Clone My MAC Address
OK
Apply
Cancel

Figure 9-172: MAC Cloning Settings

2. Enter the physical MAC address to be cloned.

3. Press the 'Clone My MAC Address' button.

9.8.8 Diagnostics

The Diagnostics screen can assist you in testing network connectivity and viewing statistics, such as the number of packets transmitted and received, round-trip time and success status. Please note that the test tools depicted below are platform-dependent, and therefore may not all be available at once. Access this feature either from the 'Diagnostics' tab in the 'Internet Connection' screen, or by clicking its icon in the 'Advanced' screen. The 'Diagnostics' screen appears:

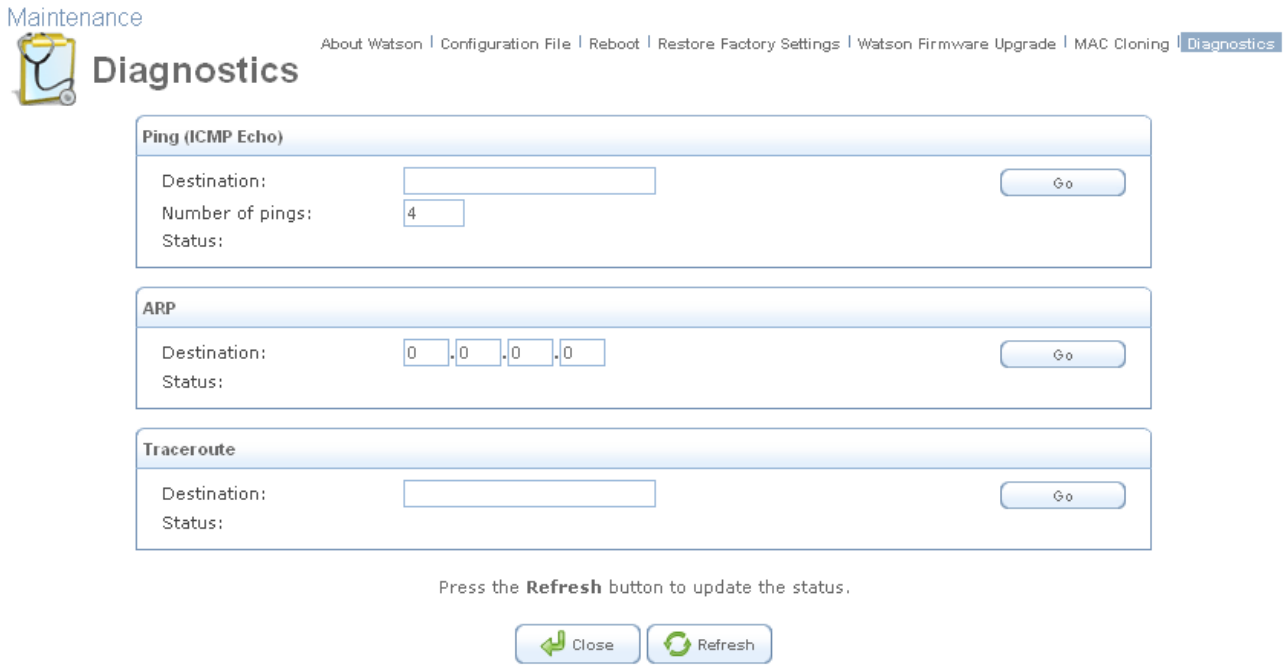


Figure 9-173: Advanced Diagnostics

9.8.8.1 Diagnosing Network Connectivity

To diagnose network connectivity, perform the following steps:

1. Under the Ping section, enter the IP address or URL to be tested in the 'Destination' field.
2. Enter the number of pings you would like to perform.
3. Press the 'Go' button.
4. In a few seconds, diagnostic statistics will be displayed. If no new information is displayed, press the 'Refresh' button.

9.8.8.2 Performing a Traceroute

To perform a traceroute, follow these steps:

1. Under the Traceroute section, enter the IP address or URL to be tested in the 'Destination' field.
2. Press the 'Go' button. A traceroute will commence, constantly refreshing the screen.
3. To stop the trace and view the results, press 'Cancel'.

9.9 Objects and Rules

9.9.1 Protocols

The Protocols feature incorporates a list of preset and user-defined applications and common port settings. You can use protocols in various security features such as Access Control and Port Forwarding. You may add new protocols to support new applications or edit existing ones according to your needs. To view the basic protocols list, access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Protocols' screen appears:

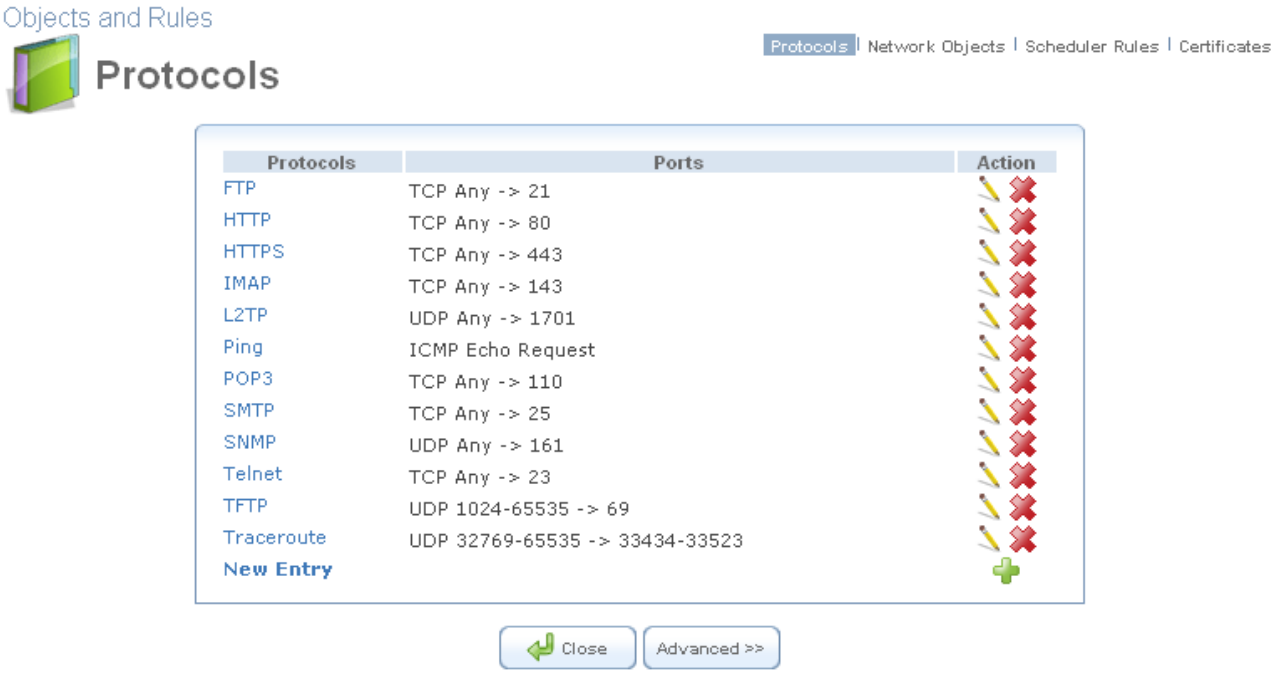


Figure 9-174: Protocols

Click the 'Advanced' button at the bottom of this screen for the full list of protocols supported by Watson.

Note that toggling this view between 'Basic' and 'Advanced' is reflected throughout the WBM wherever the protocols list is displayed, and can be set back with 'Show All Services' and 'Show Basic Services', respectively. To define a protocol:

1. Click the 'New Entry' link in the 'Protocols' screen. The 'Edit Service' screen appears:

Figure 9-175: Edit Service

2. Name the service in the 'Service Name' field, and click the 'New Server Ports' link. The 'Edit Service Server Ports' screen appears. You may choose any of the protocols available in the combo box, or add a new one by selecting 'Other'. When selecting a protocol from the combo box, the screen will refresh, presenting the respective fields by which to enter the relevant information.

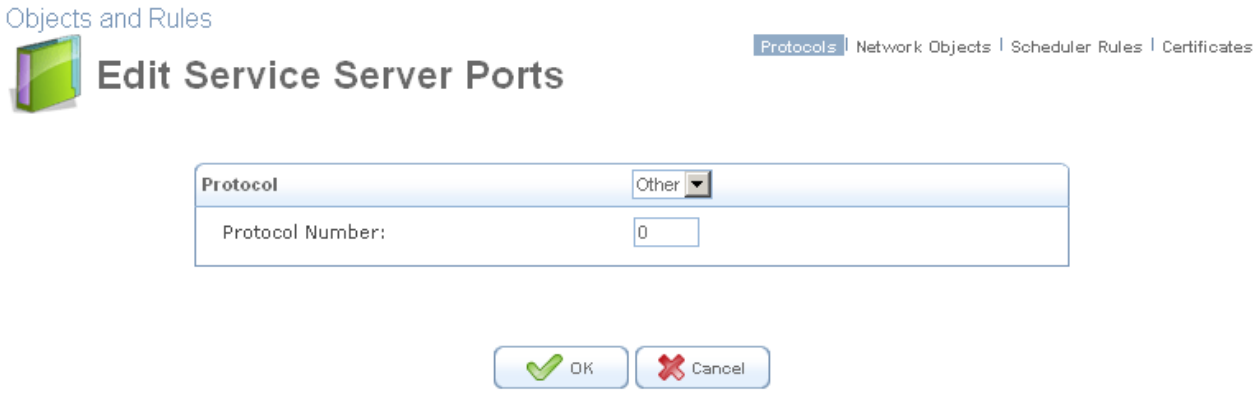


Figure 9-176: Edit Service Server Ports

3. Select a protocol and enter the relevant information.

4. Click 'OK' to save the settings.

9.9.2 Network Objects

Network Objects is a method used to abstractly define a set of LAN hosts, according to specific criteria, such as MAC address, IP address, or host name. Defining such a group can assist when configuring system rules. For example, network objects can be used when configuring Watson's security filtering settings such as IP address filtering, host name filtering or MAC address filtering. You can use network objects in order to apply security rules based on host names instead of IP addresses. This may be useful, since IP addresses change from time to time. It is also possible to define network objects according to MAC addresses, making rule applica-

tion more persistent against network configuration settings. Moreover, Watson supports DHCP Option 60, enabling application of security and QoS rules on a network object according to its unique vendor class ID. For example, an IP telephone can be identified and applied with specific QoS priority rules.

To define a network object:

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Network Objects' screen appears.

Objects and Rules
Protocols | Network Objects | Scheduler Rules | Certificates
Network Objects
A Network Object is a set of host names, IP addresses or MAC addresses. Security rules can be applied to a distinct LAN subset using Network Objects.
Network Object
Items
Action
New Entry
Close

Figure 9-177: Network Objects

2. Click the 'New Entry' link, the 'Edit Network Object' screen appears.

Figure 9-178: Edit Network Object

3. Name the network object in the Description field, and click New Entry to create it. The 'Edit Item' screen appears.

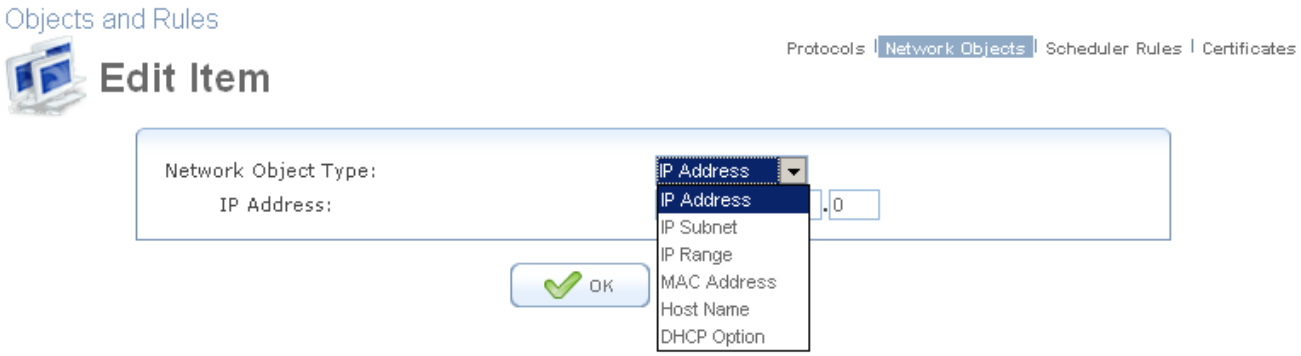


Figure 9-179: Edit Item

4. When selecting a method from the combo box, the screen refreshes, presenting the respective fields for entering the relevant information. The group definition can be according to one of the following methods:

   IP Address Enter an IP address common to the group.

   IP Subnet Enter a subnet IP address and a subnet mask.

   IP Range Enter first and last IP addresses in the range.

   MAC Address Enter a MAC address and mask.

   Host Name Enter a host name common to the group.

   DHCP Option Enter a vendor class ID if available.

5. Select a method and enter the source address accordingly.

6. Click 'OK' to save the settings.

9.9.3 Scheduler Rules

Scheduler rules are used for limiting the activation of Firewall rules to specific time periods, specified in days of the week, and hours. To define a rule:

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Scheduler Rules' screen appears:

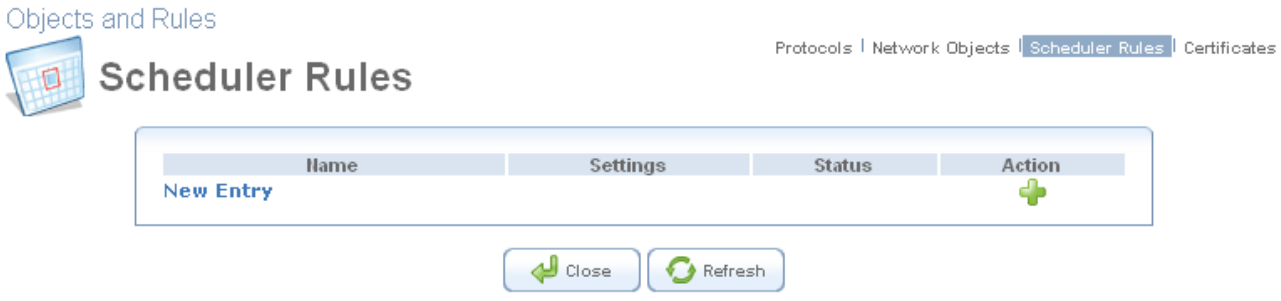


Figure 9-180: Scheduler Rules

2. Click the 'New Entry' link. The 'Edit Scheduler Rule' screen appears:

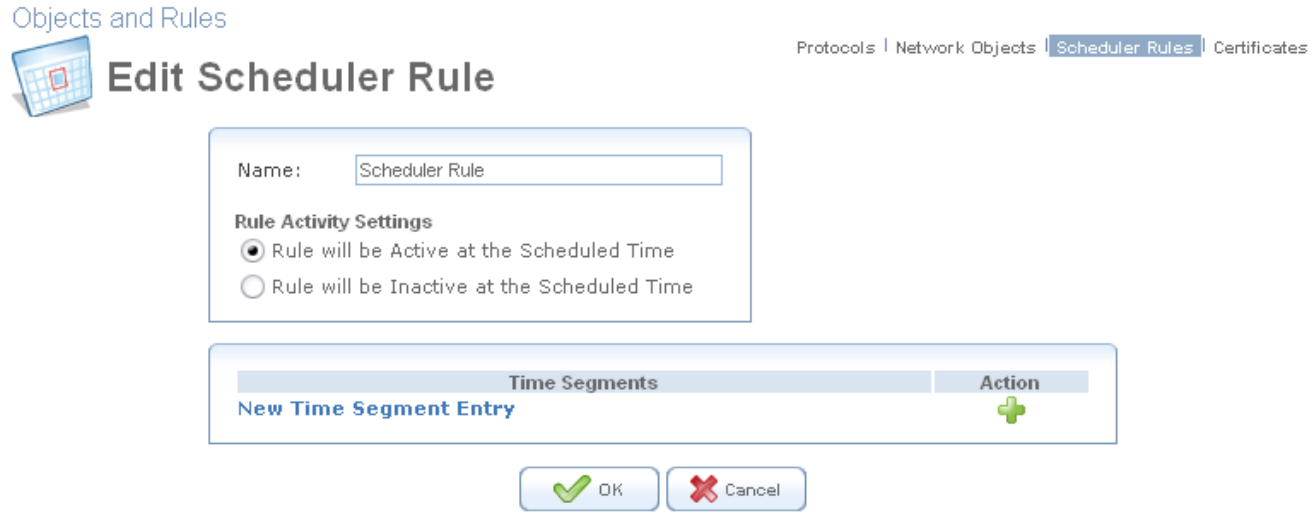


Figure 9-181: Edit Scheduler Rule

3. Specify a name for the rule in the 'Name' field.
4. Specify if the rule will be active/inactive during the designated time period, by selecting the apporpriate 'Rule Activity Settings' check-box.
5. Click the 'New Time Segment Entry' link to define the time segment to which the rule will apply. The 'Time Segment Edit' screen appears:

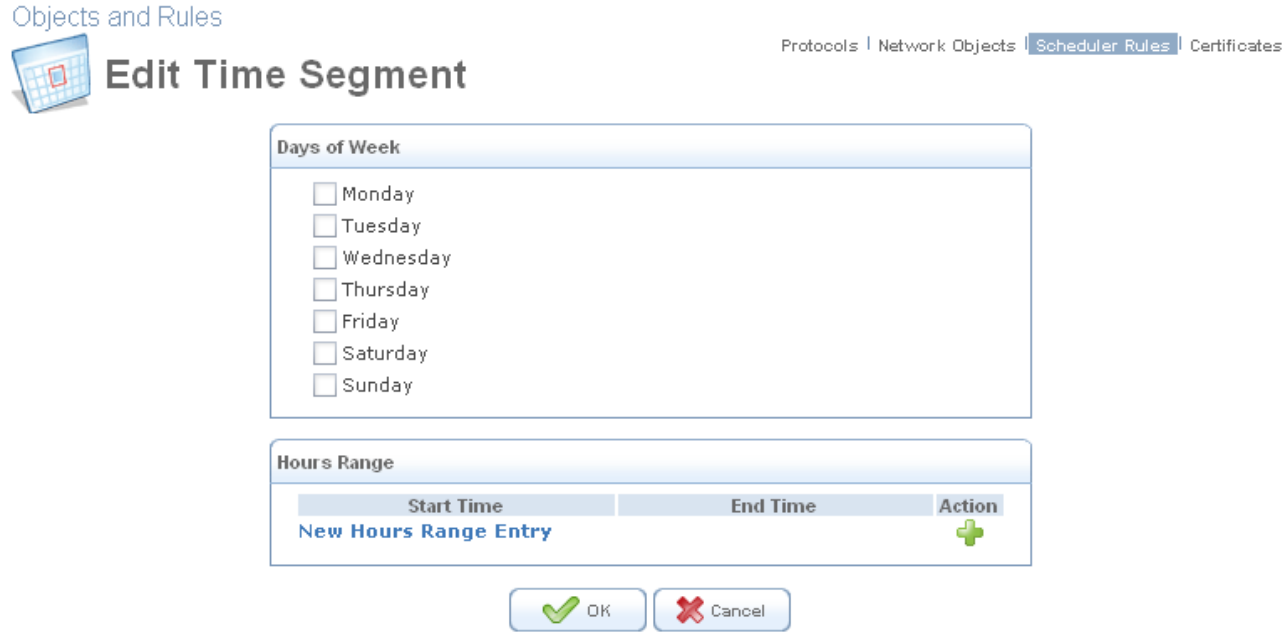


Figure 9-182: Time Segment Edit

6. Select active/inactive days of the week.
7. Click the 'New Time Segment Entry' to define an active/inactive hourly range.
8. Click 'OK' to save the settings.

9.9.4 Certificates

9.9.4.1 Overview

Public-key cryptography uses a pair of keys: a public key and a corresponding private key. These keys can play opposite roles, either encrypting or decrypting data. Your public key is made known to the world, while your private key is kept secret. The public and private keys are mathematically associated; however it is computationally infeasible to deduce the private key from the public key. Anyone who has the public key can encrypt information that can only be decrypted with the matching private key. Similarly, the person with the private key can encrypt information that can only be decrypted with the matching public key. Technically, both public and private keys are large numbers that work with cryptographic algorithms to produce encrypted material. The primary benefit of public-key cryptography is that it allows people who have no preexisting security arrangement to authenticate each other and exchange messages securely. Watson makes use of public-key cryptography to encrypt and authenticate keys for the encryption of VPN data communication, the Web Based Management (WBM) utility, and secured telnet.

9.9.4.1.1 Digital Certificates

When working with public-key cryptography, you should be careful and make sure that you are using the correct person's public key. Man-in-the-middle attacks pose a potential threat, where an ill-intending 3rd party posts a phony key with the name and user ID of an intended recipient. Data transfer that is intercepted by the owner of the counterfeit key can fall in the wrong hands. Digital certificates provide a means for establishing whether a public key truly belongs to the supposed owner. It is a digital form of credential. It has information on it that identifies you, and an authorized statement to the effect that someone else has confirmed your identity. Digital certificates are used to foil attempts by an ill-intending party to use an unauthorized public key.

A digital certificate consists of the following:

A public key

Certificate information The "identity" of the user, such as name, user ID and so on.

Digital signatures A statement stating that the information enclosed in the certificate has been vouched for by a Certificate Authority (CA).

Binding this information together, a certificate is a public key with identification forms attached, coupled with a stamp of approval by a trusted party.

9.9.4.1.2 X.509 Certificate Format

Watson supports X.509 certificates that comply with the ITU-T X.509 international standard. An X.509 certificate is a collection of a standard set of fields containing information about a user or device and their corresponding public key. The X.509 standard defines what information goes into the certificate, and describes how to encode it (the data format). All X.509 certificates have the following data:

The certificate holder's public key the public key of the certificate holder, together with an algorithm identifier that specifies which cryptosystem the key belongs to and any associated key parameters.

The serial number of the certificate the entity (application or person) that created the certificate is responsible for assigning it a unique serial number to distinguish it from other certificates it issues. This information is used in numerous ways; for example when a certificate is revoked, its serial number is placed on a Certificate Revocation List (CRL).

The certificate holder's unique identifier this name is intended to be unique across the Internet. A DN consists of multiple subsections and may look something like this: CN=John Smith, EMAIL=Watson@schmid-telecom.com, OU=R&D, O=Schmid-Telecom, C=CH (These refer to the subject's Common Name, Organizational Unit, Organization, and Country.)

The certificate's validity period the certificate's start date/time and expiration date/time; indicates when the certificate will expire.

The unique name of the certificate issuer the unique name of the entity that signed the certificate. This is normally a CA. Using the certificate implies trusting the entity that signed this certificate. (Note that in some cases, such as root or top-level CA certificates, the issuer signs its own certificate.)

The digital signature of the issuer the signature using the private key of the entity that issued the certificate.

The signature algorithm identifier identifies the algorithm used by the CA to sign the certificate.

9.9.4.2 Watson Certificate Stores

Watson maintains two certificate stores:

1. Watson Local Store This store contains a list of approved certificates that are used to identify Watson to its clients. The list also includes certificate requests that are pending a CA's endorsement. You can obtain certificates for Watson using the following methods:

   - Requesting an X509 Certificate This method creates both a private and a matching public key. The public key is then sent to the CA to be certified.
   - Creating a Self-Signed Certificate This method is the same as requesting a certificate, only the authentication of the public key does not require a CA. This is mainly intended for use within small organizations.
   - Loading a PKCS#12 Format Certificate This method loads a certificate using an already available and certified set of private and public keys.

2. Certificate Authority (CA) Store This store contains a list of the trusted certificate authorities, which is used to check certificates presented by Watson clients.

9.9.4.2.1 Requesting an X509 Certificate

To obtain an X509 certificate, you must ask a CA to issue you one. You provide your public key, proof that you possess the corresponding private key, and some specific information about yourself. You then digitally sign the information and send the whole package – the certificate request – to the CA. The CA then performs some due diligence in verifying that the information you provided is correct and, if so, generates the certificate and returns it. You might think of an X509 certificate as looking like a standard paper certificate with a public key taped to it. It has your

name and some information about you on it, plus the signature of the person who issued it to you.

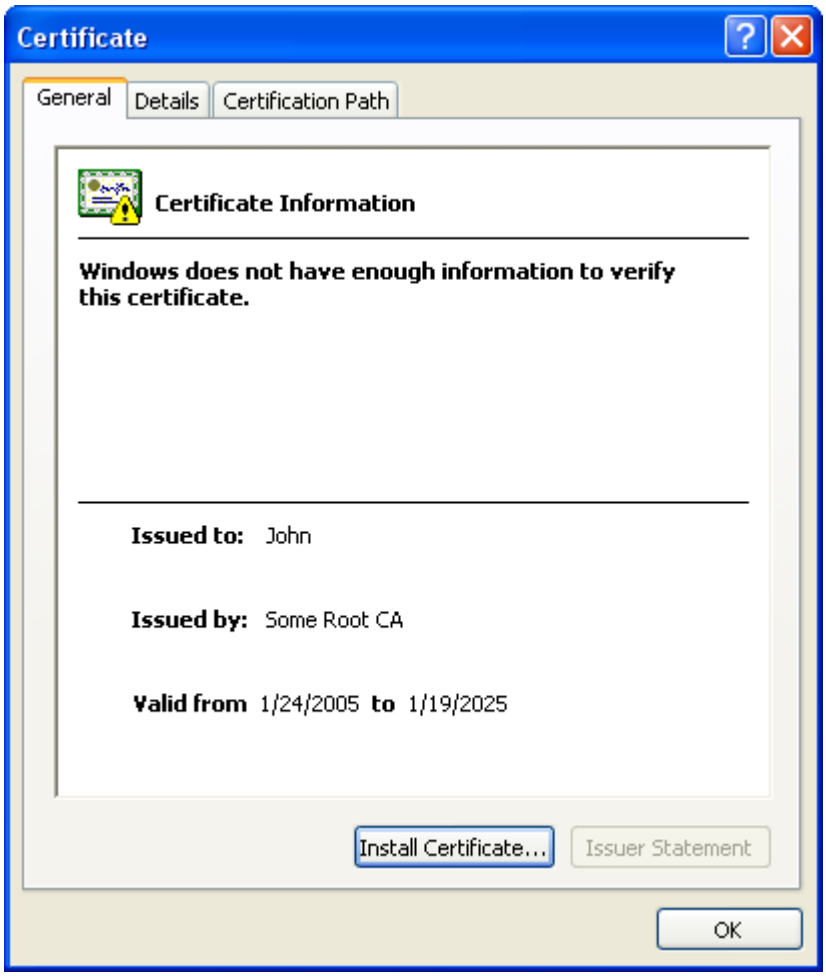


Figure 9-183: Certificate Window

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Certificates' screen appears.

Figure 9-184: Certificate Management

2. Click the 'Create Certificate Request' button. The 'Create X509 Request' screen appears:

Figure 9-185: Create X509 Request

3. Enter the following certification request parameters:

- Certificate Name
- Subject
- Organization
- State
- Country

4. Click the 'Generate' button. A screen appears, stating that the certification request is being generated.

5. After a short while, press the 'Refresh' button, until the 'Save Certificate Request' screen appears.

6. Click the 'Save Certificate Request' button and save the request to a file.

7. Click the 'Close' button. The main certificate management screen reappears, listing your certificate as "Unsigned". In this state, the request file may be opened at any time by pressing the action icon and then 'Open' in the dialogue box (Windows only).

Figure 9-186: Unsigned Certification Request

8. After receiving a reply from the CA in form of a '.pem' file, click the 'Upload Certificate' link. The 'Load Watson's Local Certificate' screen appears.

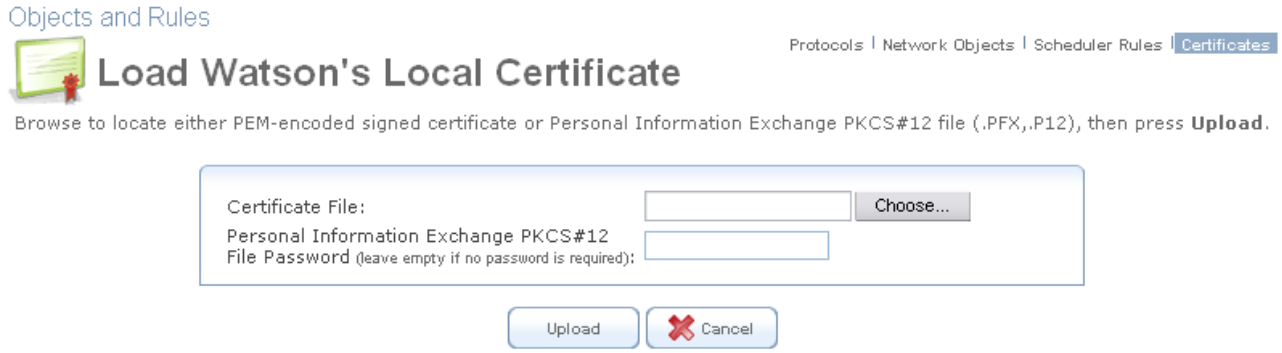

Objects and Rules
Load Watson's Local Certificate
Protocols | Network Objects | Scheduler Rules | Certificates
Browse to locate either PEM-encoded signed certificate or Personal Information Exchange PKCS#12 file (.PFX,.P12), then press Upload.
Certificate File:
Choose...
Personal Information Exchange PKCS#12
File Password (leave empty if no password is required):
Upload
Cancel

Figure 9-187: Load Certificate

9. Use the Browse button to browse to the signed certificate '.pem' file. Leave the password entry empty and press "Load" to load the signed certificate. The certificate management screen appears, displaying the certificate name and issuer.

10. Click the Save button and then 'Open' in the dialogue box to view the 'Certificate' window (Windows only). Alternatively, click 'Save' in the dialogue box to save the certificate to a file.

11. You can also click the edit action icon to view the 'Certificate Details' screen.

9.9.4.2.2 Creating a Self-Signed Certificate

A default self-signed certificate is included in Watson, in order to enable certificate demanding services such as HTTPS. Note that if deleted, this certificate is restored when Watson's Restore Defaults operation is run (refer to Section 9.8.4). To create a self-signed certificate:

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Certificates' screen appears (see Figure 9-184).
2. Click the 'Create Self Signed Certificate' button. The 'Create Self Signed X509 Certificate' screen appears.

Figure 9-188: Create Self Signed X509 Certificate

3. Enter the following certification request parameters:
   - Certificate Name
   - Subject
   - Organization
   - State
   - Country
4. Click the 'Generate' button. A screen appears, stating that the certificate is being generated.

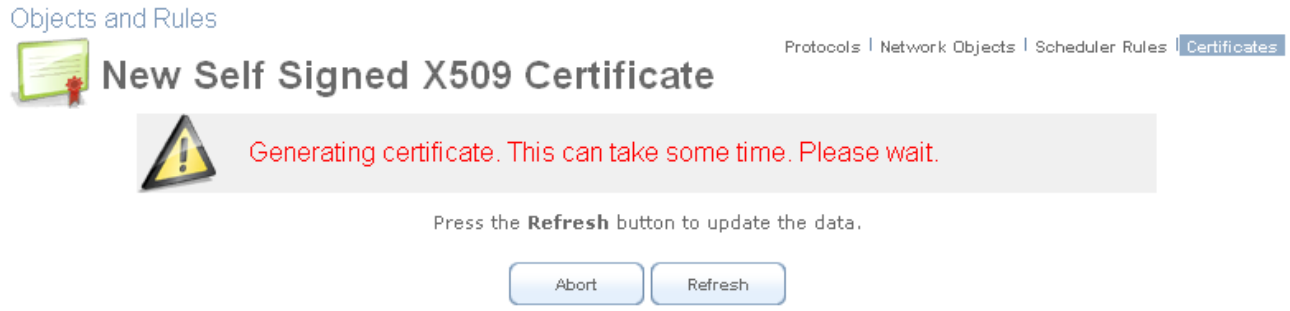

Objects and Rules
Protocols | Network Objects | Scheduler Rules | Certificates
New Self Signed X509 Certificate
Generating certificate. This can take some time. Please wait.
Press the Refresh button to update the data.
Abort
Refresh

Figure 9-189: Generating Certificate

5. After a short while, press the 'Refresh' button, until the 'Certificate Details' screen appears.

Figure 9-190: Certificate Details

6. Click the 'OK' button. The main certificate management screen reappears, displaying the certificate name and issuer.

Figure 9-191: Loaded Certificate

7. Click the Save button and then 'Open' in the dialogue box to view the 'Certificate' window (Windows only). Alternatively, click 'Save' in the dialogue box to save the certificate to a file.

8. You can also click the edit action icon to view the 'Certificate Details' screen.

9.9.4.2.3 Loading a PKCS#12 Format Certificate

You can load certificates in PKCS#12 format (usually stored in .p12 files) to Watson's certificate store. You must first obtain the '.p12' file, containing the private and public keys and optional CA certificates.

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Certificates' screen appears (see Figure 9-184).

2. Click the 'Load Certificate' link. The 'Load Watson's Local Certificate' screen appears:

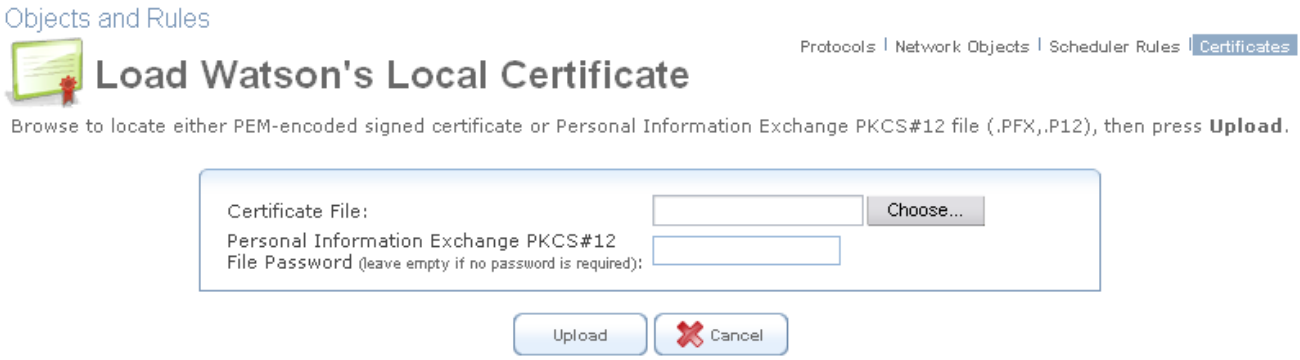

Objects and Rules
Protocols | Network Objects | Scheduler Rules | Certificates
Load Watson's Local Certificate
Browse to locate either PEM-encoded signed certificate or Personal Information Exchange PKCS#12 file (.PFX,.P12), then press Upload.
Certificate File:
Choose...
Personal Information Exchange PKCS#12 File Password (leave empty if no password is required):
Upload
Cancel

Figure 9-192: Load Certificate

3. Use the Browse button to browse to the '.p12' file. If the private key is encrypted using a password, type it in the password entry (otherwise leave the entry empty) and press "Load" to load the certificate. The certificate management screen appears, displaying the certificate name and issuer. If the '.p12' file contained any CA certificates, they will be displayed in the CA store (click the 'CA's' tab to view the CA certificates).

4. Click the Save button and then 'Open' in the dialogue box to view the 'Certificate' window (Windows only) (see Figure 9-183). Alternatively, click 'Save' in the dialogue box to save the certificate to a file.

5. You can also click the edit action icon to view the 'Certificate Details' screen.

9.9.4.2.4 Loading a CA's Certificate

Before you can load a CA's certificate, you must obtain a signed certificate '.pem' or '.p12' file.

1. Access this feature either from the 'Objects and Rules' tab under the 'System' screen, or by clicking its icon in the 'Advanced' screen. The 'Certificates' screen appears (see Figure 9-184).

2. Click the 'CA's' certificates tab. The 'CA Certificates' screen appears.

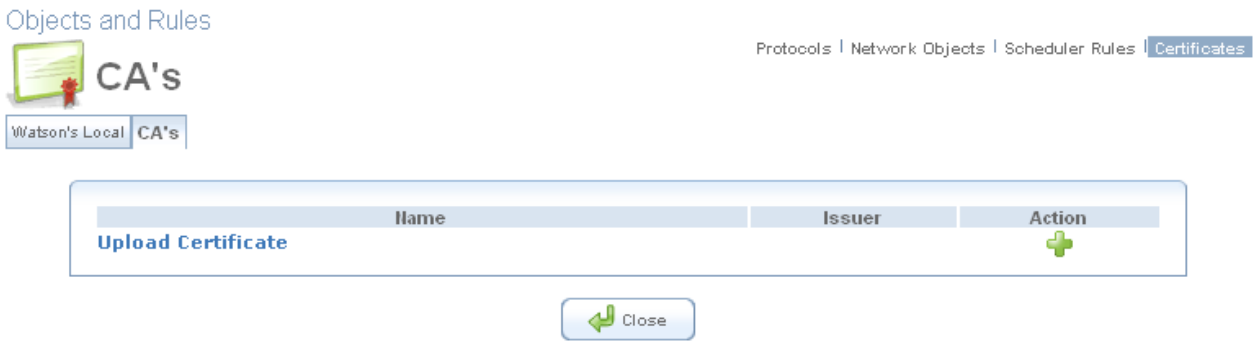


Figure 9-193: CA's Certificates

3. Click the 'Upload Certificate' link. The 'Load CA's Certificate' screen appears.

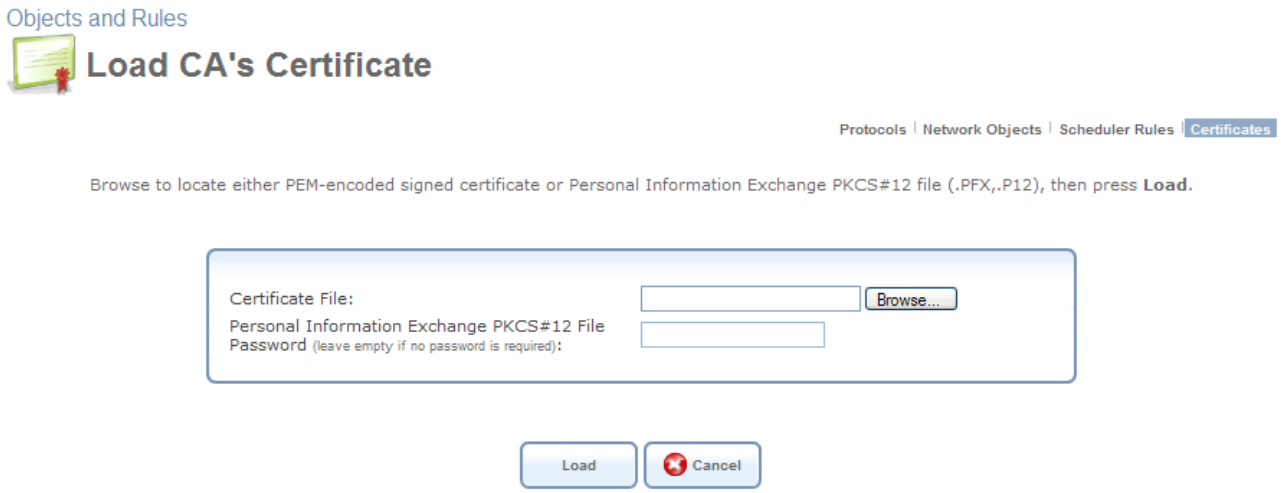

Objects and Rules
Load CA's Certificate
Protocols | Network Objects | Scheduler Rules | Certificates
Browse to locate either PEM-encoded signed certificate or Personal Information Exchange PKCS#12 file (.PFX,.P12), then press Load.
Certificate File:
Browse...
Personal Information Exchange PKCS#12 File Password (leave empty if no password is required):
Load
Cancel

Figure 9-194: Load CA's Certificate

4. Use the Browse button to browse to the '.pem' or '.p12' file. Leave the password entry empty and press "Load" to load the certificate. The CA Certificates screen reappears, displaying the trusted certificate authority at the bottom of the list.
5. Click the Save button and then 'Open' in the dialogue box to view the 'Certificate' window (Windows only). Alternatively, click 'Save' in the dialogue box to save the certificate to a file.
6. You can also click the edit action icon to view the 'Certificate Details' screen.

10 Advanced

This section of the Web-based Management offers shortcuts to Watson's advanced features. The different icons redirect to their respective screens, described throughout this manual. Please note that changes to advanced settings may adversely affect the operation of Watson and your home network, and should be made with caution.

Figure 10-1: Advanced

This screen enables you to configure the following features:

About Watson – View various details about Watson's software version, such as Software and Hardware version number. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.1).

BGP OSPF – Manage BGP and OSPF configuration. This icon redirects to the 'Routing' tab under 'System' (refer to Section 9.6.2).

CPU Monitor – View Watson CPU load and running processes. This icon redirects to the 'Monitor' tab under 'System' (refer to Section 9.5.2).

Certificates – Manage digital certificates. This icon redirects to the 'Objects and Rules' tab under 'System' (refer to Section 9.9.4).

Configuration File – View, save and load the configuration file. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.2).

DNS Server – View and modify the DNS hosts table. This icon redirects to the 'Advanced' tab under 'Services' (refer to Section 8.6.1).

Diagnostics – Perform networking diagnostics. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.8).

Firewall – Configure the gateway's firewall. This icon redirects to the 'Firewall' tab under 'Services' (refer to Section 8.2.1).

Firmware Upgrade – Upgrade Watson's software image. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 0).

IP Address Distribution – Modify the behavior of the DHCP server for each LAN/WAN device and view a list of DHCP clients in the local network. This icon redirects to the 'IP Address Distribution' tab under 'Services' (refer to Section 8.6.2).

IPSec – Configure Internet protocol security parameters. This icon redirects to the 'VPN' tab under 'Services' (refer to Section 8.4.1).

Installation Wizard – Step-by-step procedure that guides you through establishing an Internet connection. This icon redirects to the 'Installation Wizard' tab under 'Home' (refer to Section 5.3).

MAC Cloning – Clone your PC's MAC address. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.7).

Map View – Depicts the various network elements. This icon redirects to the 'Map View' tab under 'Home' (refer to Section 5.2).

Network Monitor – View network connection data. This icon redirects to the 'Monitor' tab under 'System' (refer to Section 9.5.2).

Network Objects – Define groups of LAN devices for system rules. This icon redirects to the 'Objects and Rules' tab under 'System' (refer to Section 9.9.2).

PPPoE Relay – Enable PPPoE relay on Watson. This icon redirects to the 'Routing' tab under 'System' (refer to Section 9.6.3).

PPTP Server – Configure point-to-point tunneling protocol parameters. This icon redirects to the 'VPN' tab under 'Services' (refer to Section 8.4.2).

Personal Domain Name (Dynamic DNS) – Define a static hostname for the WAN connection. This icon redirects to the 'DDNS' tab under 'Services' (refer to Section 8.5.2).

Protocols – View and edit Watson's list of supported protocols. This icon redirects to the 'Objects and Rules' tab under 'System' (refer to Section 9.9.1).

QOS – Define QoS parameters. This icon redirects to the 'QoS' tab under 'Services' (refer to Section 8.3.1).

Quick Setup – Quick configuration of the WAN Ethernet connection. This icon redirects to the Quick Setup' tab under 'Home' (refer to Section 5.4).

Reboot – Reboot Watson. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.3).

Remote Administration – Configure remote administration privileges. This icon redirects to the 'Management' tab under 'System' (refer to Section 9.7.3).

Restore Factory MAC Addresses – Allows to restore the factory MAC address. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.4).

Restore Factory Settings – Allows to restore the factory default settings. This icon redirects to the 'Maintenance' tab under 'System' (refer to Section 9.8.4).

Routing – Manage routing policies. This icon redirects to the 'Routing' tab under 'System' (refer to Section 9.6.1).

SSH – Configure Secure Shell protocol. This icon redirects to the 'Management' tab under 'System' (refer to Section 9.7.4).

Scheduler Rules – Define time segments for system rules. This icon redirects to the 'Objects and Rules' tab under 'System' (refer to Section 9.9.3).

Simple Network Management Protocol (SNMP) – Configure Watson's SNMP agent. This icon redirects to the 'Management' tab under 'System' (refer to Section 9.7.2).

System Log – View, download or clear the system activities log. This icon redirects to the 'Monitor' tab under 'System' (refer to Section 9.5.3).

System Settings – Modify administrator settings, including Watson's hostname. This icon redirects to the 'Settings' tab under 'System' (refer to Section 9.2).

Time Settings – Set the local date and time. This icon redirects to the 'Settings' tab under 'System' (refer to Section 0).

Universal Plug and Play – Configure UPnP parameters. This icon redirects to the 'Management' tab under 'System' (refer to Section 9.7.1).

Users – Configure Watson's users and their permissions. This icon redirects to the 'Users' tab under 'System' (refer to Section 9.3).

11 Appendix

11.1 List of Acronyms

ALG	Application-Level Gateway
API	Application Programming Interface
BGP	Border Gateway Protocol
CPE	Customer Premise Equipment
DHCP	Dynamic Host Configuration Protocol
DMZ	Demilitarized Zone
DDNS	Dynamic DNS
DNS	Domain Name System
DSL	Digital Subscriber Line
FTP	File Transfer Protocol
HTTP	HyperText Transport Protocol
ICMP	Internet Control Message Protocol
IGMP	Internet Group Multicast Protocol
IP	Internet Protocol
IPSec	IP Security
LAN	Local Area Network

MAC	Media Access Control
MTU	Maximum Transmission Unit
NAPT	Network Address Port Translation
OAM	Operations and Maintenance
OSPF	Open Shortest Path First
POP3	Post Office Protocol 3
PPP	Point-to-Point Protocol
PPTP	Point-to-Point Tunneling Protocol
RG	Residential Gateway
RIP	Routing Information Protocol
SHDSL	Single-Pair high-speed digital subscriber line
SNMP	Simple Network Management Protocol
SPI	Stateful Packet Inspection
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
UDP	User Datagram Protocol
UPnP	Universal Plug and Play
URL	Universal Resource Locator
USB	Universal Serial Bus
VLAN	Virtual LAN
VPN	Virtual Private Network
WAN	Wide Area Network

11.2 Glossary

100Base-T Also known as "Fast Ethernet," an Ethernet cable standard with a data transfer rate of up to 100 Mbps.

10Base-T An older Ethernet cable standard with a data transfer rate of up to 10 Mbps.

802.3 The IEEE (Institute of Electrical and Electronics Engineers - defined specification that describes the characteristics of Ethernet (wired) connections.

Adapter Also known as a "network interface card" (NIC). An expansion card or other device used to provide network access to a computer, printer, or other device.

Administrator A person responsible for planning, configuring, and managing the day-to-day operation of a computer network. The duties of an administrator include installing new workstations and other devices, adding and removing individuals from the list of authorized users, archiving files, overseeing password protection and other security measures, monitoring usage of shared resources, and handling malfunctioning equipment.

Authentication The process of identifying an individual, usually based on a username and password. In security systems, authentication is distinct from authorization, which is the process of giving individuals access to system objects based on their identity. Authentication merely ensures that the individual is who he or she claims to be, but says nothing about the access rights of the individual.

Bandwidth The amount of information, or size of file, that can be sent through a network connection at one time. A connection with more bandwidth can transfer information more quickly.

Bridge A device that forwards packets of information from one segment of a network to another. A bridge forwards only those packets necessary for communication between the segments.

Broadband connection A high-speed connection, typically 256 Kbps or faster. Broadband services include cable modems and DSL.

Broadband modem A device that enables a broadband connection to access the Internet. The two most common types of broadband modems are cable modems, which rely on cable television infrastructure, and DSL modems, which rely on telephone lines operating at DSL speeds.

Broadcast Broadcasting sends a message to everyone on the network whereas multicasting sends a message to a select list of recipients.

CAT 5 cable Abbreviation for "Category 5 cable." A type of Ethernet cable that has a maximum data rate of 100 Mbps.

CHAP Challenge Handshake Authentication Protocol, a type of authentication in which the authentication agent (typically a network server) sends the client program a random value that is used only once and an ID value. The sender and peer must share a predefined secret.

Client Any computer or program that connects to, or requests the services of, another computer or program on a network. For a local area network or the Internet, a client is a computer that uses shared network resources provided by a server.

Client/server network A network of two or more computers that rely on a central server to mediate the connections or provide additional system resources. This dependence on a server differentiating a client/server network from a peer-to-peer network.

Computer name A name that uniquely identifies a computer on the network so that all its shared resources can be accessed by other computers on the network. One computer name cannot be the same as any other computer or domain name on the network.

DHCP Acronym for `Dynamic Host Configuration Protocol'. A TCP/IP protocol that automatically assigns temporary IP addresses to computers on a local area network (LAN). Watson supports the use of DHCP. You can use DHCP to share one Internet connection with multiple computers on a network.

DMZ Acronym for `demilitarized zone'. A collection of devices and subnets placed between a private network and the Internet to help protect the private network from unauthorized Internet users.

DNS Acronym for `Domain Name System'. A data query service chiefly used on the Internet for translating host names into Internet addresses. The DNS database maps DNS domain names to IP addresses, so that users can locate computers and services through user-friendly names.

Domain name An address of a network connection that identifies the owner of that address in a hierarchical format: server.organization.type. For example, http://www.whitehouse.gov identifies the Web server at the WhiteHouse, which is part of the U.S. government.

Domain In a networked computer environment, a collection of computers that share a common domain database and security policy. A domain is administered as a unit with common rules and procedures, and each domain has a unique name.

DSL modem A device that enables a broadband connection to access the Internet. DSL modems rely on telephone lines that operate at DSL speeds.

DSL Acronym for `Digital Subscriber Line'. A constant, high-speed digital connection to the Internet that uses standard copper telephone wires.

Duplex A mode of connection. Full-duplex transmission allows for the simultaneous transfer of information between the sender and the receiver. Half-duplex transmission allows for the transfer of information in only one direction at a time.

Dynamic IP address The IP address assigned (using the DHCP protocol) to a device that requires it. A dynamic IP address can also be assigned to a gateway or router by an ISP.

Encryption The translation of data into a secret code. Encryption is the most effective way to achieve data security. To read an encrypted file, you must have access to a secret key or password that enables you to decrypt it.

Ethernet cable A type of cable that facilitates network communications. An Ethernet cable comes in a couple of flavors. there is twisted pair, and coax Ethernet cables. Each of these allow data to travel at 10Mbit per second.

Ethernet A networking standard that uses cables to provide network access. Ethernet is the most widely-installed technology to connect computers together.

Firewall A security system that helps protect a network from external threats, such as hacker attacks, originating outside the network. A hardware Firewall is a connection routing device that has specific data checking settings and that helps protect all of the devices connected to it.

Firmware Software information stored in nonvolatile memory on a device.

FTP Acronym for `File Transfer Protocol'. The standard Internet protocol for downloading, or transferring, files from one computer to another.

Gateway address The IP address you use when you make a connection outside your immediate network.

Gateway A device that acts as a central point for networked devices, receives transmitted messages, and forwards them. Watson can link many computers on a single network, and can share an encrypted Internet connection with wired and wireless devices.

Hexadecimal A numbering system that uses 16 rather than 10 as the base for representing numbers. It is therefore referred to as a base-16 numbering system. The hexadecimal system uses the digits 0 through 9 and the letters A through F (uppercase or lowercase) to represent the decimal numbers 0 through 15. For example, the hexadecimal letter D represents the decimal number 13. One hexadecimal digit is equivalent to 4 bits, and 1 byte can be expressed by two hexadecimal digits.

Host name The DNS name of a device on a network, used to simplify the process of locating computers on a network.

Hub A device that has multiple ports and that serves as a central connection point for communication lines from all devices on a network. When data arrives at one port, it is copied to the other ports.

IEEE Acronym for `Institute of Electrical and Electronics Engineers'. A society of engineering and electronics professionals that develops standards for the electrical, electronics, computer engineering, and science-related industries. The IEEE (Eye-triple-E) is a non-profit, technical professional association of more than 377,000 individual members in 150 countries. The full name is the Institute of Electrical and Electronics Engineers, Inc., although the organization is most popularly known and referred to by the letters I-E-E-E.

Infrastructure network A network configuration in which wireless devices connect to a wireless access point (such as Watson) instead of connecting to each other directly.

Internet domain In a networked computer environment, a collection of computers that share a common domain database and security policy. A domain is administered as a unit with common rules and procedures, and each domain has a unique name.

Intranet A network within an organization that uses Internet technologies (such a Web browser for viewing information) and protocols (such as TCP/IP), but is available only to certain people, such as employees of a company. Also called a private network. Some intranets offer access to the Internet, but such connections are directed through a Firewall.

IP address Acronym for `Internet Protocol' address. IP is the protocol within TCP/IP that is used to send data between computers over the Internet. An IP address is an assigned number used to identify a computer that is connected to a network through TCP/IP. An IP address consists of four numbers (each of which can be no greater than 255) separated by periods, such as 192.168.1.1.

IP Acronym for `Internet Protocol'. The protocol within TCP/IP that is used to send data between computers over the Internet. More specifically, this protocol governs the routing of data messages, which are transmitted in smaller components called packets.

ISO/OSI reference model Abbreviation for "International Organization for Standardization Open Systems Interconnection" reference model. An architecture that standardizes levels of service and types of interaction for computers that exchange information through a communications network. The ISO/OSI reference model separates computer-to-computer communications into seven protocol layers, or levels; each builds on and relies on the standards contained in the levels below it. The lowest of the seven layers deals solely with hardware links; the highest deals with software interactions at the program level. It is a fundamental blueprint designed to help guide the creation of hardware and software for networks.

ISP Acronym for `Internet service provider'. A company that provides individuals or companies access to the Internet.

Kbps Abbreviation of `kilobits per second'. Data transfer speed, as through a modem or on a network, measured in multiples of 1,000 bits per second.

LAN Acronym for `local area network'. A group of computers and other devices dispersed over a relatively limited area (for example, a building) and connected by a communications link that enables any device to interact with any other on the network.

MAC address Abbreviation for `media access control' address. The address that is used for communication between network adapters on the same subnet. Each network adapter is manufactured with its own unique MAC address.

MAC layer Abbreviation for `media access control' layer. The lower of two sub layers that make up the data-link layer in the ISO/OSI reference model. The MAC layer manages access to the physical network, so a protocol like Ethernet works at this layer.

Mbps Abbreviation of `megabits per second'. A unit of bandwidth measurement that defines the speed at which information can be transferred through a network or Ethernet cable. One megabyte is roughly equivalent to eight megabits.

Modem A device that transmits and receives information between computers.

MPPE Microsoft Point to Point Encryption (MPPE) is a means of representing Point to Point Protocol (PPP) packets in an encrypted form.

Multicast To transmit a single message to a select group of recipients. A simple example of multicasting is sending an e-mail message to a mailing list. Teleconferencing and videoconferencing also use multicasting, but require more robust protocols and networks.

NAT Acronym for `network address translation'. The process of converting between IP addresses used within a private network and Internet IP addresses. NAT enables all of the computers on a network to share one IP address.

Network adapter Also known as a `network interface card' (NIC). An expansion card or other device used to provide network access to a computer, printer, or other device.

Network name The single name of a grouping of computers that are linked together to form a network.

Network A collection of two or more computers that are connected to each other through wired or wireless means. These computers can share access to the Internet and the use of files, printers, and other equipment.

Packet A unit of information transmitted as a whole from one device to another on a network.

PAP Password Authentication Protocol, the most basic form of authentication, in which a user's name and password are transmitted over a network and compared to a table of name-password pairs. Typically, the passwords stored in the table are encrypted. The Basic Authentication feature built into the HTTP protocol uses PAP.

PC Card A peripheral device that adds memory, mass storage, modem capability, or other networking services to portable computers.

Peer-to-peer network A network of two or more computers that communicate without using a central server. This lack of reliance on a server differentiates a peer-to-peer network from a client/server network.

PING A protocol for testing whether a particular computer is connected to the Internet by sending a packet to the computer's IP address and waiting for a response.

Plug and Play A set of specifications that allows a computer to automatically detect and configure various peripheral devices, such as monitors, modems, and printers.

Port A physical connection through which data is transferred between a computer and other devices (such as a monitor, modem, or printer), a network, or another computer. Also, a software channel for network communications.

PPPoE Acronym for `Point-to-Point Protocol over Ethernet'. A specification for connecting users on an Ethernet network to the Internet by using a broadband connection (typically through a DSL modem).

PPTP IP Security, a set of protocols developed to support secure exchange of packets at the IP layer. IPsec has been deployed widely to implement Virtual Private Networks (VPNs).

PPTP Point-to-Point Tunneling Protocol, a technology for creating Virtual Private Networks (VPNs). Because the Internet is essentially an open network, the Point-to-Point Tunneling Protocol (PPTP) is used to ensure that messages transmitted from one VPN node to another are secure. With PPTP, users can dial in to their corporate network via the Internet.

Profile A computer-based record that contains an individual network's software settings and identification information.

Protocol A set of rules that computers use to communicate with each other over a network.

Resource Any type of hardware (such as a modem or printer) or software (such as an application, file, or game) that users can share on a network.

Restore factory defaults The term used to describe the process of erasing your base station's current settings to restore factory settings. You accomplish this by pressing the Reset button and holding it for five or more seconds. Note that this is different from resetting the base station.

RJ-45 connector An attachment found on the ends of all Ethernet cables that connects Ethernet (wired) cables to other devices and computers

Server A computer that provides shared resources, such as storage space or processing power, to network users.

SNTP Acronym for `Simple Network Time Protocol'. A protocol that enables client computers to synchronize their clocks with a time server over the Internet.

Static IP address A permanent Internet address of a computer (assigned by an ISP).

Subnet mask Typically, a subnet may represent all the machines at one geographic location, in one building, or on the same local area network (LAN). Having an organization's network divided into subnets allows it to be connected to the Internet with a single shared network address. Similar in form to an IP address and typically provided by an ISP. An example of a subnet mask value is 255.255.0.0.

Subnet A distinct network that forms part of a larger computer network. Subnets are connected through routers and can use a shared network address to connect to the Internet.

Switch A central device that functions similarly to a hub, forwarding packets to specific ports rather than broadcasting every packet to every port. A switch is more efficient when used on a high-volume network.

Switched network A communications network that uses switching to establish a connection between parties.

Switching A communications method that uses temporary rather than permanent connections to establish a link or to route information between two parties. In computer networks, message switching and packet switching allow any two parties to exchange information. Messages are routed (switched) through intermediary stations that together serve to connect the sender and the receiver.

TCP/IP Acronym for `Transmission Control Protocol/Internet Protocol'. A networking protocol that allows computers to communicate across interconnected networks and the Internet. Every computer on the Internet communicates by using TCP/IP.

Throughput The data transfer rate of a network, measured as the number of kilobytes per second transmitted.

UTP Acronym for `unshielded twisted pair'. A cable that contains one or more twisted pairs of wires without additional shielding. It's more flexible and takes less space than a shielded twisted pair (STP) cable, but has less bandwidth.

Virtual server One of multiple Web sites running on the same server, each with a unique domain name and IP address.

VPN A Virtual Private Network (VPN) is a private Network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling Protocol and security procedures.

WAN Acronym for `wide area network'. A geographically widespread network that might include many linked local area networks.

11.3 Licensing Acknowledgement and Source Code Offering

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